THE ARCHAEOLOGY OF THE GUADALUPE CORRIDOR

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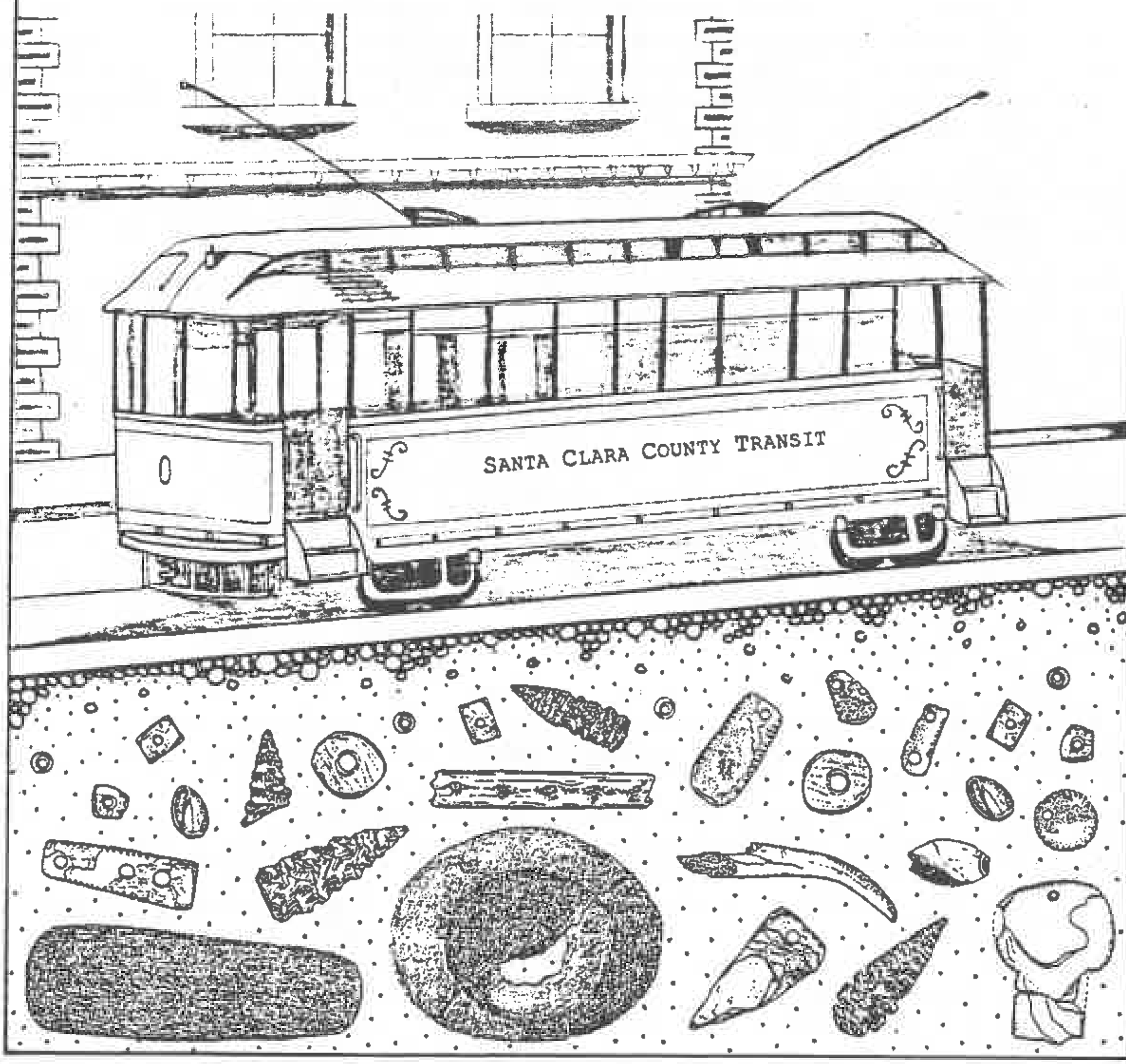


SANTA CLARA COUNTY ARCHAEOLOGICAL SOCIETY

INTRODUCTION

This report is a summary overview of the archaeological resources recovered during construction activities in the Guadalupe Corridor Transportation Project (Guadalupe Corridor). From 1982 to 1991 this construction project became the impetus for site testing and data recovery from many archaeological sites in the Santa Clara Valley. These prehistoric sites were investigated in several phases--including field survey, backhoe testing, hand-excavation, construction monitoring and salvage recovery. Resulting from these archaeological studies is the largest intersite corpus of data heretofore assembled from the Santa Clara Valley. Thirteen prehistoric sites with cemetery remains from 461 graves provide the data for a more trenchant archaeological study of Native American culture in this region than any single study has provided to date.

Specific reports (see references at the end of this report) were prepared for each phase of the testing and recovery programs. These individual reports contain the specific findings of the various recovery programs in detail. This overview report is not intended to be a comprehensive presentation or catalog of all the materials recovered at all the Guadalupe Corridor sites. Instead, it presents a general summary of the archaeological data and the implications these data have upon the interpretation of prehistoric life in the Santa Clara Valley region. This report examines basic patterns in the artifacts, burial practices, and other aspects of day-to-day life characteristic of the prehistoric inhabitants of the lower (northern) Santa Clara Valley.

The first part of this report presents an overview of the environmental and ethnographic background of the Guadalupe Corridor region. The ethnographic section is fairly comprehensive, and much of this information is drawn from historical accounts of native culture as recorded by missionaries and explorers. This ethnographic setting provides a cultural background for the archaeological data and interpretations. The archaeological analysis begins with a brief summary of the archaeological sites in the Guadalupe Corridor, followed by a discussion of the chronology of these sites. Next, a discussion of the burial data recovered from the sites provides an intersite comparison of social hierarchy and general mortuary practices. A comparison of the osteological remains from the Guadalupe Corridor follows the general mortuary analysis. This is followed by an illustrated presentation of the artifactual materials recovered from all the sites in the Guadalupe Corridor, accompanied by discussions of various artifact types. After these discussions, consideration is given to the prehistoric subsistence practices that can be discerned from the available data. Finally, conclusionary remarks will offer general statements on what we have learned from the archaeological studies, and forward additional research questions for future studies in the area.

This summary overview refers to two previously written models of Santa Clara Valley archaeology. In 1973 King and Hickman developed a research design for the archaeological investigation of the Southern Santa Clara Valley, an area just to the south of the Guadalupe Corridor. Their design predicts that certain environmental zones are likely areas for permanent prehistoric settlement due to the abundance of local resources. This ecological situation moves King and Hickman to propose a reconstruction of the human settlement patterns: certain areas, such as the canyons, were most commonly used as large or permanent occupation sites, whereas smaller occupational or seasonal sites were generally located in marshes or on alluvial plains. King and Hickman also discuss the changing social systems that accompany semi-sedentary societies, as increasing population influences the development of new subsistence strategies, increased organization, competition for resources, and forms of population control.

The King and Hickman model is a useful heuristic for the investigation of the Southern Santa Clara Valley, and it also has some bearing on the overall archaeological investigation of the Guadalupe Corridor. The geographical focus of the King and Hickman model to areas south of the Guadalupe Corridor, however, prevents the model from being directly relevant to the current study. This is particularly so because the Guadalupe Corridor is located in a much more narrow catchment area than the area studied by King and Hickman. In addition, all of the investigated sites in the Guadalupe Corridor are large occupational sites on the valley floor, a fact which renders King and Hickman's discussion of settlement patterns across different ecological zones somewhat inapplicable. However, their discussion of the effects that increased population has on social complexity is pertinent to the sites in the Guadalupe Corridor, as chronological and settlement evidence suggests fluctuating population densities over time. Hypotheses regarding the influence of the environment, population, trade, and culture on changing social organization will be considered in various sections of this work.

Roop and others (1982) prepared a theoretical model which is directly relevant to the archaeology of the Guadalupe Corridor. In a study specifically written for the Guadalupe Corridor Project, Roop et al. (ibid.) analyzed the environment of the region and divided it into two zones, the Guadalupe Division in the north and the Santa Teresa Division in the south. They predicted that the inhabitants of these two zones would have differential access to resources, especially the resources of the San Francisco Bay. Roop et al.'s hypotheses are discussed in detail in the environment and ecology section.

THE GUADALUPE CORRIDOR SITES

The area of the Guadalupe Corridor encompasses a relatively narrow transect of land running in a roughly north-south direction through the center of the Santa Clara Valley. This land contained several prehistoric habitation and burial sites that contained evidence of long-term use. The inter-relationships between these sites is an important aspect of this study, but it must be considered that the sites discussed are not the only sites in the greater Santa Clara Valley.

The inhabitants of the sites along the Guadalupe Corridor carried on extensive interactions with the inhabitants of other village sites. Some of these interactions were with sites located within the project area, but others were doubtlessly with sites outside of the Corridor. Unfortunately, these intersite relationships outside the corridor are not well understood, and consequently, only interactions between sites investigated in the course of the Guadalupe Corridor Transportation Project are addressed in this study. While the conclusions drawn in this report are fairly well supported by data from the investigated sites, it must be remembered that they only comprise a small portion of the known and potential traces of prehistoric life in the Santa Clara Valley.

The archaeological sites directly studied in this report are: SCl-6E/447; SCl-6W; SCl-68; SCl-128; SCl-137; SCl-294; SCl-295: SCl-296; SCl-300; SCl-302; SCl-418; and SCl-690. All of these sites lie physically along the Guadalupe Corridor, and most of these have portions of deposit that extend beyond the limits of the impacted area. Almost all of these sites have received archaeological attention in the context of projects separate from the Corridor project, and thus there exists a large body of data available to add to the already weighty volume of information generated from the Corridor study itself. The archaeological studies of Corridor sites conducted for this project, combined with previous studies of these sites, present a database that is many times larger than any previously assembled in another archaeological work in the South San Francisco Bay region. Two of the sites alone, SCl-6

and SCl-690, contained the largest burial populations in the South Bay area. This extensive amount of data, the key interconnections between the sites, and the information from 461 burial lots all together provide an invaluable opportunity to see the prehistoric past of the Santa Clara Valley with more detail and analytical insight than ever before possible.

ENVIRONMENT AND ECOLOGY

All human societies are affected by the environments in which they live. This fact is especially true for non-food producing people like Native Californians, who were much more sensitive to the natural distributions of useful resources than people like ourselves, who have opted to develop ways of changing our local environment to suit our needs, and have developed vast networks for the distribution of the resources that we use. Native Californians did do a few things to affect their local environment: they periodically set fires on valleys and hillsides in order to increase the natural regrowth of desired species, procured several important dietary and non-dietary resources through trade, and sometimes overexploited certain resources to the point that resource depletion occurred in a local area. But the ability of aboriginal peoples to influence the locations where essential resources occurred was extremely limited. Thus, understanding the natural history and ecology of the Santa Clara Valley is essential for one to understand the character of prehistoric settlement in the Guadalupe Corridor.

The major geological feature that affected prehistoric human adaptation in the Santa Clara Valley is the San Francisco Bay region: a system of rolling hills and valleys which was subjected to repeated episodes of flooding and drying during interglacial and glacial periods of the Pleistocene epoch (1.6 million to about 10,000 years ago). The most recent filling of the San Francisco Bay began at the end of the last glaciation (approximately 15,000 years ago). From this time until about 7,000 years ago, quickly melting glaciers led to a rapid rise in global sea level and consequent rapid flooding of the bay. From 7,000 years ago up to the present, sea level rise occurred much more slowly, and hence the depth of the bay grew more slowly as well (Bickel 1978).

A consequence of this relatively rapid initial filling was that the more fragile marshland environments could not begin to develop until the rate of sea level rise had slowed. Although estuarine environments appeared in the bay as early as 8,000 years ago (Moratto 1984: 221), it was not until 4,000 years ago that marshes began to form at the mouths of the present day Coyote Creek and Guadalupe River (Elsasser 1986:6), and many of the marshlands bordering other areas of the bay were probably established no more than 3,000 years ago (Atwater and Hedel 1976). These ecological areas were strategically productive for the indigenous groups in the Bay Area (see Margolin 1978), and many archaeological sites in the lower Santa Clara Valley existed in these marshy zones.

In addition to global sea level rise during the Holocene, cyclical climatic changes in California undoubtedly affected the character of prehistoric life. Of particular importance for understanding the prehistory of the Santa Clara Valley is the history of climatic fluctuation beginning with the Altithermal, a period of abnormally warm, dry conditions that lasted from about 7000 B.P. (before the present) to 2900 B.P. Following the Altithermal, between 2900 and 1500 B.P., conditions were cool and moist; but this situation was interrupted by an intense warm/dry episode from 1500 to 600 B.P. (Moratto, King, and Woolfenden 1978: 151). This period was followed by a return to cool/moist conditions that lasted until about 100 years ago, at which time California's climate again reverted to warm/dry conditions. It should be clear that both the post-Pleistocene development of the San Francisco Bay and fluctuations in temperature and humidity patterns potentially had

significant effects on prehistoric adaptations in the Santa Clara Valley. Possible explanations of the impact of these natural processes on life in the Guadalupe Corridor will be offered throughout this report.

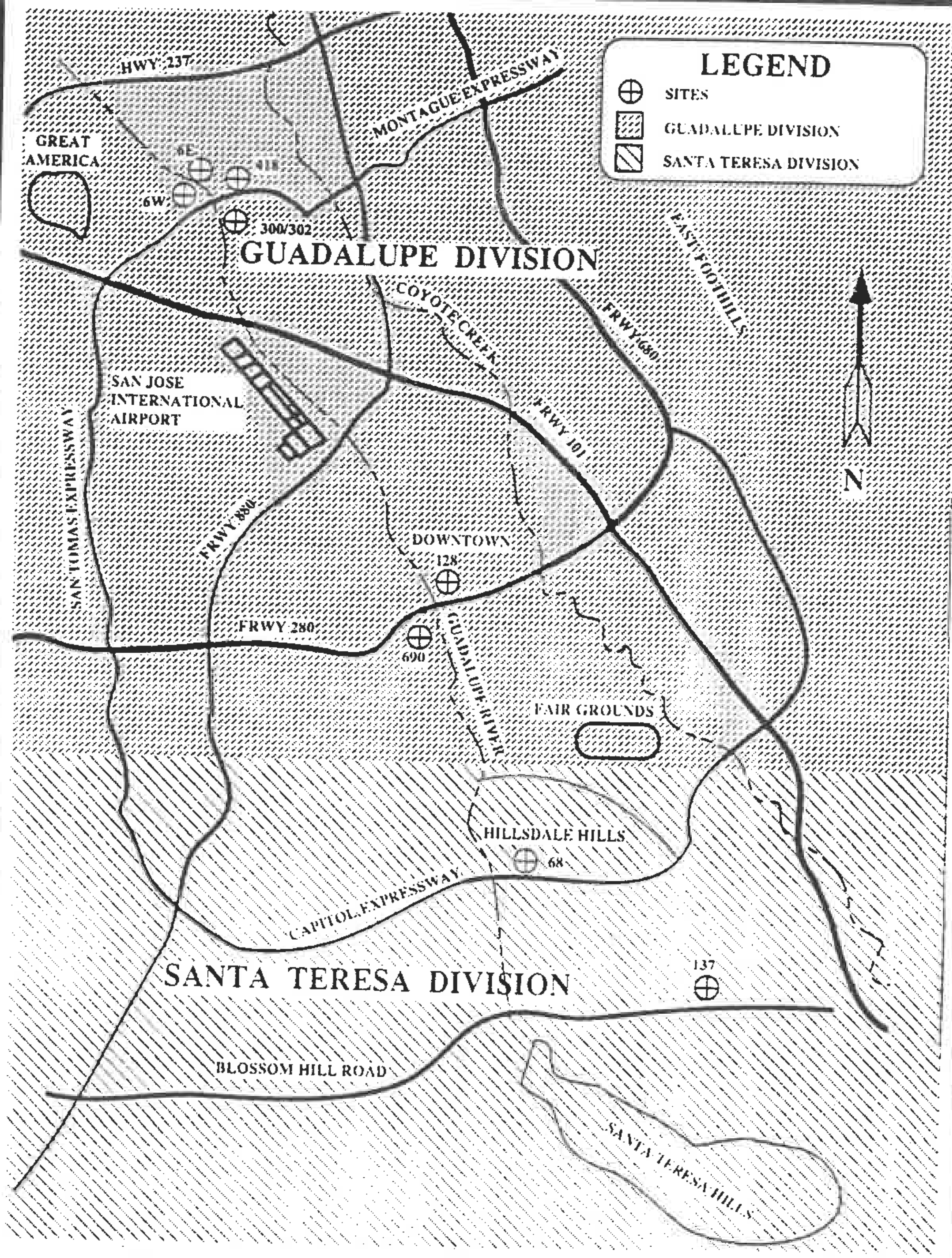
In addition to reconstructions of the prehistoric environment, consideration of the resources available in the present-day Santa Clara Valley can go a long way towards placing the prehistoric societies in a meaningful context. To this end, Roop et al. prepared a report on the general background and ecology of the Guadalupe Corridor in 1982. In this report, Roop and his co-authors subdivided the area into two parts: one in the north, which he called the Guadalupe Division, and one in the south, called the Santa Teresa Division. They defined the Guadalupe Division as ranging from Alviso to the Hillsdale Hills, whereas the Santa Teresa Division spans the area south of the Hillsdale Hills to the base of the Santa Teresa Hills and beyond to the Coyote narrows (Roop et al. 1982: 5). In addition to defining these two main areas, Roop et al. made some predictions about the possible differences in subsistence strategies that prehistoric occupants might have employed.

Roop et al.'s basic division of the area into the Guadalupe and Santa Teresa Divisions was largely based on the different natural resources that would be available to the two areas. The northern Guadalupe Division, situated fairly close to the bayshore, had more immediate access to the rich bay resources of that region (especially birds and shellfish) (Roop et al. 1982: 4-5, 56). In contrast, it would have been more difficult for the inhabitants of the Santa Teresa Division to acquire these resources. In addition, Roop et al. described basic environmental differences between the two divisions. The northern Guadalupe Division consisted primarily of salt marshes and grasslands with some interspersed freshwater marshes. The central feature of the southern Santa Teresa Division, on the other hand, was the freshwater Canoas Marsh (Roop et al. 1982: 5). Later studies tend to confirm the descriptions introduced by Roop and his co-authors. This report continues the discussion over the value of this internal division of the project area as an analytic tool.

Guadalupe Division

The Guadalupe Division, or northern half of the project area, lies roughly between the Guadalupe River and Coyote Creek. Along the Guadalupe Corridor this region includes prehistoric sites SCl-300/302, SCl-6W/6E, SCl-128, SCl-418, and SCl-690. Constant flooding during the rainy season in this division caused alluviation on a fairly large scale, making this land highly fertile (Cartier et al. 1990). The Guadalupe Division contrasts with the Santa Teresa Division in that the marshes located in the former area were generally found to be filled with brackish water and the land was typical of a lowland grassland (Cartier et al. 1979). Prehistorically, this Division, lying roughly between Alviso and the Hillsdale Hills, was an area generally dominated by its proximity to the bay. Salt marsh terrain laced with estuaries and sloughs was the most common ecozone close to the bay. Beyond these marshes at higher elevations, however, substantial grassland regions existed in which seasonal wetlands (such as ephemeral lakes) sometimes developed in response to rainfall and topography. The upper boundaries of these grasslands were dotted with occasional fresh water marshes that varied in size seasonally. Diversity, then, was the central characteristic of the prehistoric environment of the Guadalupe Division. This wide range of plant life produced an attractive subsistence base for the human inhabitants (Roop et al. 1982).

Flooding of the Guadalupe River and Coyote Creek appears to have forced at least some of the inhabitants of the region to migrate during the rainy season. Faunal and shellfish remains at SCl-6E, for instance, indicate that despite the rich species diversity of the area throughout the year, the site was unoccupied during the months of heaviest rain (Cartier et



Guadalupe Corridor Area

al. 1979; Bard et al. 1986). SCl-300 and SCl-302 also appear to have experienced heavy flooding and abandonment in the rainy season (Cartier 1979; James et al. 1987). Other sites in the Guadalupe Division may also have been abandoned during the rainy season. Unfortunately, the existing data are insufficient to determine if this is definitely the case. If it is true that the prehistoric inhabitants of the sites in the Guadalupe Division moved for part of the year, it is probable that they went to higher ground in the foothills of the Santa Clara Valley. They may have also split into smaller groups and dispersed for a few months of the year. Alternatively, they may have moved to another location as a large group. This topic requires and deserves further study. The effects of seasonal flooding on site formation, preservation and visibility also deserves further attention, as the results of such work may have implications for future studies.

Santa Teresa Division

Located to the south of the Guadalupe Division and thus farther away from the bay, the Santa Teresa Division lacks salt water marshes and instead is dominated by the freshwater Canoas Marsh. This marsh was surrounded by seasonal wetlands and grasslands, with oak savanna and chaparral near the hills of the region's borders (Roop et al. 1982). Excavated sites within this division include SCl-68 and SCl-137. Roop's preliminary investigation indicated that the prehistoric inhabitants of the region focused primarily on the resources of the freshwater wetlands (ibid: 5). He postulated that any saltwater resources utilized by the inhabitants of the Santa Teresa Division may have been acquired only through trade with the inhabitants of the Guadalupe Division.

European explorers, upon making contact with the native inhabitants of the Santa Teresa Division, wrote descriptions of the societies they encountered. Anza (quoted in Roop et al. 1981) writes about the native adaptation to living within the watery world of the marsh:

> All the country which we have traversed today, with the exception of that which we traveled over the last hills, is barren on any pasturage or brush or trees, and apparently it continues in the same way toward the east. We assume that it is for this reason that we have not seen any Indian today in the marshes and tulares, but we know from the smokes that there are Indians, although they do not come out to this region, for we did not even see any tracks. We attempted to go to the nearest village, but it was not possible because of the mires and the waters of the various sloughs which we saw the Indians cross in their little rafts, of which we saw two made of this tule. We also saw that they made little mounds of earth as sites for their villages, to free them somewhat from the water.

Roop et al. points out that the mounds were not actually built by the native inhabitants, but rather selected as sites because they were already somewhat elevated. Over time the mounds naturally grew larger as the inhabitants built up a substantial midden deposit.

It does not appear that the sites in the Santa Teresa Division were as susceptible to flooding as those in the Guadalupe Division. Canoas Creek did flood to some degree, but this did not seem to necessitate a relocation out of the area. Rather than abandon the sites during these times, however, the inhabitants appear to have attempted to maintain their residences year-round. Excavation data from SCl-68, for instance, indicates that the site was inhabited all year, and that the inhabitants simply moved to a different part of the site during the rainy season (Fong et al. 1988). Likewise, although SCl-137 may have been a seasonal camp, the presence of acorn storage granaries seems to indicate some degree of permanence (Bard et al. 1986), and perhaps indicates that the prehistoric inhabitants of these sites uti-

lized a subsistence strategy characterized more by collecting than by foraging (Binford 1980).

While it is useful to divide the project area into two regions for analysis, it should be noted that all the sites in both divisions were interrelated and interdependent to some degree. In fact, the large amount of ecological diversity within such a short range was probably a major reason for the extensive habitation of this area. The inhabitants did not limit themselves to any small subset of the total available resources; rather they attempted to exploit the full range of resources in the region. Thus dividing the area is somewhat artificial. As Heizer and Whipple (1971) point out: "Particular groups of California Indians in some cases had easy access to more than one type of environment and hence are sometimes not readily assignable to a single ecological group." As will be discussed below in the subsistence section, the data collected from the excavated sites in the Guadalupe Corridor project area indicate that the sites in the two divisions did in fact utilize different resources to some extent. However, these differences should be viewed in context of the high degree of interrelatedness between the divisions.

ETHNOGRAPHIC BACKGROUND

Early ethnographic accounts of local Native American cultures provide a cultural context against which the archaeological remains can be compared and contrasted. The Ohlone, or Costanoan, Indians inhabited the region from the Golden Gate south to Big Sur. The research area for this study is located primarily in the Tamyen (or Thamien) linguistic area, which shared many cultural traits with other linguistic groups in the Ohlone region. It is believed that the Ohlone inhabited the area since approximately A.D. 500, and that speakers of the Hokan language previously inhabited at least part of the region (Levy 1978). However, it is unclear when the Hokan or even earlier Paleo-Indians first came to the area. The earliest radiocarbon dates that are available for the area from the Golden Gate south to Big Sur are 13,000-8000 B.P. at the Scotts Valley Site (SCr-177) (Cartier 1988), 9200 and 8500 B.P. at SCl-178 (Hildebrandt 1983), 3200 B.P. at the University Village Site (SMa-77) (Gerow 1968: 119), 6628 B.P. at Camden Avenue (SCl-64) (Winter 1977), and 6349 B.P. at SCl-106 (Cartier 1980).

The Ohlone were gatherers and hunters who utilized only the native flora and fauna with the exception of one domesticate, the dog. Yet, the abundance and high quality of natural resources allowed them to settle in semi-sedentary villages. Parties went out from the major villages at different times of the year to locations within the tribal territory to obtain various resources.

The variation from mountainous to bay regions in the Santa Clara Valley made a wide range of resources available to the native inhabitants during different seasons. In the winter months, the low-lying flats near the San Francisco Bay have abundant marine and waterfowl resources, whereas the surrounding mountainous areas are best in the summer months for their nut, seed, and mammalian resources (King and Hickman 1973). A primary food source was acorns, abundant in autumn and easily stored for the remainder of the year. According to Gifford (1951), the acorn industry of California is probably the most characteristic feature of its domestic economy. An elaborate process of grinding and leaching acorns is necessary to render them palatable. The acorn industry first became a major source of food in the Middle Period, as is indicated by the growing abundance of mortars and pestles in the archaeological record (King and Hickman 1973). Other important resources include various plant foods, land animals, and the marine resources of the San Francisco Bay. Both large and small land mammals were typically hunted, trapped, or poi-

soned. Many items, including shell beads and ornaments, were extensively traded with other groups as far away as the Great Basin of Nevada (Davis 1974).

It has been argued that, contrary to the typically rigid economic classifications of prehistoric societies as either agricultural or hunting and gathering, native Californian groups, including the Ohlone, practiced a form of resource management that does not fit neatly into either category. Bean and Lawton (1976) consider the Ohlone pattern a "semi-agricultural" stage which included quasi-agricultural harvesting activity and proto-agricultural techniques. Some plants were pruned and reseeded seasonally for optimal production. Foods such as acorns were stored for many months at a time. Ethnographic accounts also report the repeated burning of woodlands grassbelt to increase animal and plant resources. It is likely to have made hunting conditions better by reducing scrubby growth and encouraging the growth of grasses and other plants that are appealing to grazers such as deer and elk. The plant growth succession after a burning is also rich in grains and legumes that were major food sources for Native Californians.

Bean and Lawton also claim that the abundance of plant and animal resources in California and the development of ingenious technological processes were major factors in the development of complex social organizations and interactions among prehistoric Native Californian groups. These include extensive political systems, controlled production and redistribution of goods, and alliances and trade with other groups.

POLITICAL AND SOCIAL ORGANIZATION

Anthropologists have long searched for a useful way of describing and categorizing the political structures of various cultures and societies around the world. Early attempts at this categorization took a ladder-like evolutionary perspective which treated societies with simple political structures as primitive and less evolved than the ideal western states (Morgan 1963). Anthropologists later recognized the ethnocentrism of this approach and were forced to develop new theories of political organization. In 1971, Service outlined four patterns of political organization which have been accepted in the anthropological literature as useful tools if applied with discretion (Service 1971). These four patterns, which Service terms bands, tribes, chiefdoms, and states, are not evolutionary stages; they are simply descriptive generalizations about a society's political makeup. Determining the classification for a particular society is inevitably somewhat arbitrary, but there are certain features which do correspond to each pattern.

Plog and Bates (1976: 252) describe political variation on these four basic dimensions: 1) the degree to which political roles and institutions are differentiated and specialized; 2) the manner of the division of power among the individuals of the society; 3) the criteria for obtaining political authority; and 4) the degree of formal organization and centralization. They argue that each of Service's four patterns--bands, tribes, chiefdoms, and states--exist at a certain level on each of these four dimensions. A band, for instance, is generally characterized by very little role specialization, fairly equal power distribution among the members of the group, achievement of any leadership roles that do exist through merit rather than inheritance, and a relatively informal organizational structure. Tribes, chiefdoms, and states have increasingly greater complexity along all four of these dimensions.

Societies in prehistoric California have generally been categorized as either bands or tribes. Since agriculture did not exist in the state before the arrival of the missionaries, societies remained relatively mobile and thus did not accumulate the stores of wealth which are often associated with the beginnings of the centralized power found in chiefdoms and states. The

difference between a band and a tribe is a fairly fine line, however. Unlike bands, tribes have an organizational structure which allows the several parts of the tribe to unite for important joint functions (Plog and Bates 1976). These functions include such activities as work projects and ceremonial gatherings, as well as military alliances to deal with foreign threats.

Information on the political structure of the prehistoric habitation of the Santa Clara Valley is largely taken from ethnographic data on the Ohlone Indians at the time of European contact. Even though the Ohlone were hunter-gatherers like their predecessors in the region, the abundance and high quality of natural resources allowed them to settle in semi-sedentary villages. The Ohlone were typically organized in basic political units consisting of 100 to 250 members which Kroeber called "tribelets" (Kroeber 1954). By using this term, Kroeber effectively placed the level of political organization of the Ohlone and their predecessors between the band and the tribe. The "tribelet" was an autonomous social unit consisting of one or more permanent villages with smaller villages in a relatively close proximity (Kroeber 1962). There is evidence that these villages would occasionally unite for certain purposes, possibly including warfare. This is an important point, for evidence of warfare is found at several sites in this study as discussed later in the presentation of the burial data.

Politically, the Ohlone triblets were lead by a headman, or chief. Such status was passed down patrilineally, with the title possibly going to the chief's daughter, if no male heirs existed. Chiefly families were believed to have been so endowed since the creation of the Ohlone people. Only people from these families were viewed as capable of such a position by people both within and in other communities (Margolin 1978: 105). The chief led the council of elders, was an advisor to the community, and was the host to visitors from other tribes. As a means of marking affiliation, individuals in the triblets would identify themselves and their tribelet with various animals from their religious pantheon, and Ohlone chiefs were known to keep captives or slaves in the tribelet's main village (Heizer 1978; Harrington 1933).

Households within the Ohlone villages were composed of extended families that were arranged into patrilineages or patriclans (Palou 1930). These households consisted of many nuclear families that were predominantly related through the male descent line. The number of individuals that belonged to the extended family ranged from an average of ten in the Gilroy Valley, to an average of fifteen individuals in the vicinity of Mission San Carlos (Broadbent 1972).

MARRIAGE AND DAILY LIFE

Ohlone marriages were primarily monogamous. Marriage patterns ranged from cross-cousin marriages, which was found among the Chochenyo Ohlone, "wife's brother's daughter" marriages, common among the Awaswas, Chalon, Mutsun, and Rumsen, and sororal polygyny, found occasionally among all Ohlone. In the latter case, two sisters would marry a common husband (Margolin 1978).

Popular forms of entertainment were gambling and athletic games. Among the gambling games played by the Ohlone were '*toussi*' in which four players would try to guess which hand conceals a small wooden tube, and '*takersia*,' a game in which the object is to keep a small hoop spinning around a five foot piece of cane. The athletic games played included a ball game in which one would kick or hit with a stick a wooden or stone ball along a course, and a game that involved the use of a stone or wooden puck (Culin 1902-1903: 248, 282, 472).

TRADE

According to Davis (1974), *Olivella* shell beads were the most frequently traded item among the Ohlone tribelets. Shell trade items reveal an extensive trade network that reaches as far as the Great Basin of Nevada. There, a string of *Olivella biplicata* beads were found which dated to 8,600 years ago (Heizer 1978: 691). Information for trade at the local sites most often relies on the presence of *Olivella* beads and other molluscan remains which came from the coast and bay regions, Monterey chert from the Santa Cruz Mountains and San Mateo coast, and obsidian samples coming from the Napa Glass Mountain, Casa Diablo, Annadel, and Bodie Hills (Davis 1974).

Also of importance in trading was cinnabar (a pigment), which came from the New Almaden area of Santa Clara County. Trade of cinnabar took place with representatives of tribes from as far away as the State of Washington. According to Mission records, disputes over the rights to the cinnabar mines often resulted in fighting between tribes. In fact, in 1841 an expedition that had come from Sacramento and Tulare to quarry the mine was attacked by the Santa Clara Ohlone, and one of their members was killed (Margolin 1978: 99).

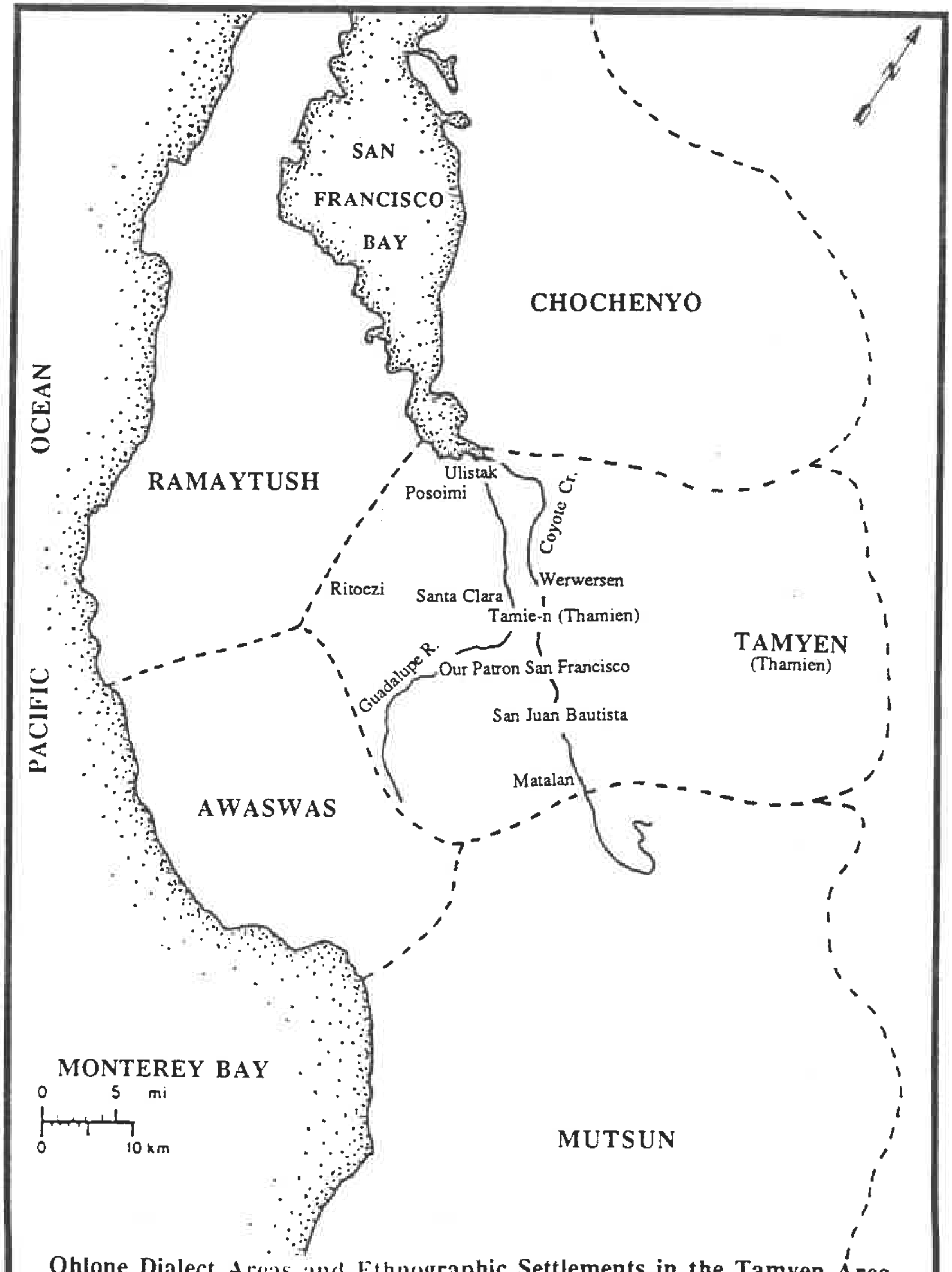
Other items that were often traded by the Ohlone were *Haliotis* (abalone) shells, projectile points, dogs, tobacco, hides, bows, baskets, salt, acorns, and fish (Davis 1974). The volcanic glass obsidian, an extremely valuable material used in tool manufacture, was also heavily traded among the Ohlone. Because obsidian has particular characteristics which allow the archaeologist to trace its source, it is possible to determine the extent of obsidian trade routes at the time of occupation of the Guadalupe Corridor sites. Analysis of obsidian artifacts found in the Corridor reveal that trade routes extended north to Napa Valley and east to the Sierras.

LANGUAGE

As mentioned above, linguistic research indicates that speakers of Ohlone languages moved into the San Francisco and Monterey Bay area at approximately 500 A.D., and in doing so they probably forced out the Hokan language speakers who lived in the area previously (Levy 1970). The Penutian languages are sub-divided into four language families: the Wintuan, Mianduan, Yokutsan, and Utian. The Miwokan and Costanoan language subgroups fall in the Utian language family. The language spoken in the Guadalupe Corridor area at the time of European contact, known as Tamyen (or Thamien), is one of eight known Costanoan languages.

According to Margolin (1978), as the tribelets became more and more settled and self-sufficient, they began to develop different customs. Within the Tamyen language there were many different dialects at the time of European contact. According to Father Lorenzo Asesara of Mission Santa Cruz "There are as many dialects as villages. Even if the villages are no more than a couple of leagues apart, when they are not allied, their dialects are so distinct that they do not understand each other in the least" (Margolin 1978: 63). The great diversity of languages that are found in areas inhabited by the Ohlone has lead some to speculate that the villages lived in isolation for great spans of time.

In California, linguistic evidence has often been used in the development of culture-historical models that can be tested against the archaeological record. For example, the primary theory of prehistoric culture change in the Monterey Bay region is founded upon the notion



Ohlone Dialect Areas and Ethnographic Settlements in the Tamyen Area

of the replacement of Hokan speaking peoples by a Penutian speaking population, which is supposedly mirrored in the archaeological record (Moratto 1984). The Guadalupe Corridor data unfortunately have little to add to such debates, in that the majority of the components excavated date to a single period and possess similar material cultures. This may in fact be an advantage, however, as culture-historical models often neglect to consider variation within sites of the same region and period, and tend to consider population movements as the sole driving force behind changes in the archaeological record. This study, therefore, considers environmental change, population growth and ecological factors, in addition to population movements, as potential explanations for the variability observed in the Corridor data.

MYTHOLOGY, RELIGION, AND THE SUPERNATURAL

The information contained in this section is based on information on the Ohlone when possible. However, when these sources are inadequate, information is derived from other central California native groups (Margolin 1978: 4).

The "shamans" in Ohlone society were the primary link between members of the community and the supernatural world. These shamans offered cures for diseases that afflicted the individual or tribe and would conduct rites to help bring about a successful hunt or ensure an abundance of food for the group. Illnesses were often treated by the shaman "sucking" things such as stones, insects, worms, or sticks out from the afflicted person's body, which was believed to rid the person of his or her illness. Herbal cures were also used to treat patients and were applied in the form of tonics, enemas, eye-wash, and poultices. Curing performances often included singing and dancing by the shaman. Such performances tended to be long and are believed to have been performed in a state of trance (Heizer 1974).

"Grizzly bear" doctors, who were known to have had bear claws and teeth filled with poison, specialized in afflicting harm on victims (Merrian 1966). Such practices of witchcraft were common among the Ohlone. The tribes of the Ohlone believed that serious illnesses were brought about by shamans through magical means.

Abundance of food and game was insured by conducting fertility ceremonies in the local villages. The shaman performed rites which would bring a good annual harvest, preferred species of acorns, or a large salmon run (Margolin 1978). Religious gestures such as prayer, fasting, sweating, and food taboos were used to obtain good luck when fishing or hunting.

The Ohlone believed it to be possible to divine future events through the interpretation of dreams. Appearances of dead relatives during dreams is said to have caused much fear in individuals (Heizer 1974). Prayer sticks were used by the Ohlone to mark holy places. These sticks were about a yard long and were decorated with tufts of eagle's feathers. Offerings of meat were often left with these prayer sticks.

In Ohlone mythology, animals were often believed to have anthropomorphic attributes and superhuman intelligence. At the top of the Ohlone pantheon were the Eagle and Coyote, with the Hawk, Falcon, Condor, Owl, Fox, Roadrunner, Antelope, Deer, Hummingbird, and Raven filling lesser roles. The Coyote was viewed as the trickster who could and often did bring hardships into the world (Gayton 1935).

Ceremonies involving the sun, moon, and other heavenly bodies indicate the Ohlone were familiar with some aspects of astronomy. Heizer (1974) noted that the sun was the focus

of religious attention, with offerings being made to it of food and seeds. According to Margolin (1978), the direction of the setting sun was thought to lead across the sea to the land of the dead. Further, eclipses were seen by some groups as the sun being devoured by mythological creatures. Rituals were practiced at these times to restore harmony to the world.

Upon the death of an Ohlone individual, their body was either cremated or buried on that very day. Rites of Tonsure (cutting of hair) were performed by the female relatives of the deceased. These rites also included smearing their faces with ashes, as well as beating their head and chest with stones (Broadbent 1972). The possessions of the deceased were either burned or interred with the remains. Also buried were offerings from the community, such as food for life in the afterworld.

HOUSING MATERIAL AND STRUCTURE

Housing in the Ohlone villages consisted of dome-shaped structures of bent willow thatched with tule, alfalfa, or fern (Bard et al. 1981: 10). Firepits were located at the center of the structures, whereas the entrances generally faced a central plaza (Cartier et al. 1979). Also found in the villages were sweathouses (*temescals*), which were excavated pits in the middle of a stream with superstructures laid against the banks (Heizer 1974). Dance houses were yet another structure common in Ohlone villages. These structures were often located in the village proper. These houses were generally circular or oval-shaped structures with two opposing doors.

CLOTHING, JEWELRY, AND BASKET WEAVING

Ohlone men, in times of warm weather, went naked or wore a short skirt-like garment. Tattoos as well as pierced ears and septa were common among the men in the village. The body was often adorned with red pigment. The women in the tribe were also sparsely clothed during the warmer times of the year, their clothing being primarily a "small front apron of braided grasses with a rear one of tanned buck skin." In cold weather both sexes wore robes of rabbit skin, buckskin, duck feathers, or sea otter pelts (Kroeber 1954). Hair ranged from long to cropped, with women wearing bangs and men at times wearing beards. Undesirable hair was removed by either shell tweezers or hot coals. Jewelry consisted of shell, bone, stone, and feathers, necklaces of carved or whole *Olivella* beads, and pendants of abalone (Levy 1978).

Basket making, along with acorn preparation, was nearly a daily task for the Ohlone women. Though these baskets were frequently used, their creation was of an artistic nature, and almost every woman made them. Among the different types of baskets made by the women were: storage baskets, winnowing baskets, hopper baskets, gambling trays, water-carrying baskets, trinket baskets, seed beaters, cooking baskets, serving baskets, as well as others (Margolin 1978). Ceramics were never developed by the Ohlone.

ARCHAEOLOGICAL INVESTIGATION

SITE SUMMARIES

Below is a brief description of the major archaeological studies in the Guadalupe Corridor. Some groupings of the sites in the area appear to be so closely connected that they may be considered one site. In fact, archaeologists still debate about whether or not these sites should be labeled as single sites or smaller, multiple sites. This report treats these problematic groups of sites as closely related, closely interconnected complexes, but examines the data from each individual site independently. The sites which are closely physically connected are SCl-6 East and SCl-6 West; SCl-68, SCl-124, SCl-294, SCl-295, SCl-296 and SCl-288, SCl-300, and SCl-302.

CA-SCl-6 (The Lick Mill Road Complex)

CA-SCl-6 has been divided into two sections, SCl-6W and SCl-6E (the latter sometimes called SCl-447, but referred to as SCl-6E in this report). The one original deposit was bisected by channelization of the Guadalupe River by the Santa Clara Valley Water District. SCl-6E sits along the east side of the Guadalupe River from SCl-6W on the west side. Data from SCl-6W and SCl-6E are both presented in order to accurately understand the site. The deposits are treated together here because of their proximity in location and time of occupation. Most researchers see the two deposits as actually one larger site that encompasses both SCl-6E and SCl-6W (Bard et al. 1984; Cartier 1983, 1990; Fenenga 1981; Roop et al. 1981). Because different investigations variably treated this site as a single site or as two separate sites, analysis of the data can be complicated and confusing. Where possible this report treats the data from the two sites separately. However, in recognition of the close relationship between these two sites, some of the analysis treats the two sets of data as a single site.

The excavated data indicate that SCl-6 was a major habitation site used for various activities of hunting, gathering, and shellfish collection. Positioned within two miles of SCl-418, SCl-300, and SCl-302, SCl-6W is 3.5 miles from the current bayshore. The presence of debitage from stone tool manufacture, mortars and pestles, fire-cracked rock, and faunal remains provides evidence that the site was a habitation site rather than simply a special use camp.

Construction monitoring of the west side of SCl-6 by Cartier (1990) in a project for the City of Santa Clara revealed a substantial prehistoric cemetery within the midden deposit. One hundred thirty-nine burials were uncovered at the site, many of which were associated with artifacts. Radiocarbon dates, as well as diagnostic artifacts found in association with the burials, firmly date the occupation of SCl-6 from the Terminal Phase of the Middle Period through Phase I of the Late Period.

Shellfish remains collected from both sides of the site indicate that the inhabitants relied heavily upon *Cerithidea californica* and *Ostrea lurida*, species commonly found along the bayshore. Other bay species probably also comprised a large component of the diet of the inhabitants of SCl-6. The 139 burials recovered at SCl-6W represent the largest burial sample discussed in this report. Compared to burials at other sites in the project area, these burials contain a relatively great amount of grave goods, especially shell artifacts. SCl-6 has a relatively high variability in the amount of grave goods found within its burials. In other words, there is fairly distinct hierarchy of wealth among the burials at the site.

LITHIC ARTIFACTS

Stone tools are virtually omnipresent in the archaeological record of prehistoric sites in this region. Their wide range of utilitarian functions, coupled with their high rate of preservation, make them one of the most common types of artifacts found in archaeological sites. The lithic artifacts were used to hunt game, butcher meat, dig roots, and grind seeds, among other things. There is also some evidence that some of the projectile points were used in warfare. The lithic artifacts can be divided into two main groups: groundstone and chipped stone.

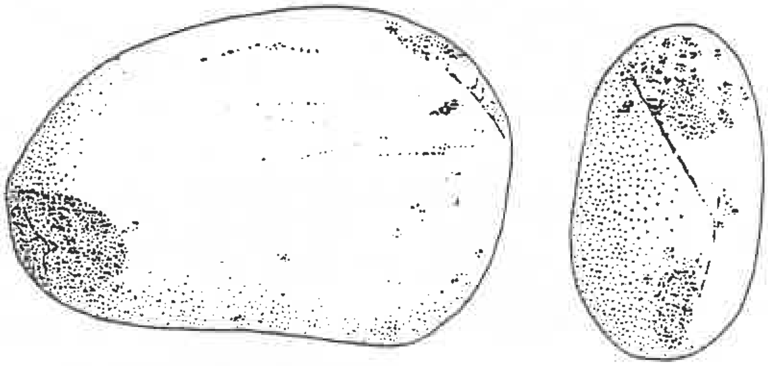
Groundstone

Graywacke sandstone was utilized in the Santa Clara Valley for the production of mortars, pestles, metates, manos, other groundstone artifacts and cooking stones. This type of sandstone is abundant in the Santa Teresa Hills, the foothills of the Santa Cruz Mountains, and in the East Foothills, thus being highly accessible to the inhabitants of the region. Groundstone artifacts served largely as food processing tools for the grinding of seeds and acorns. Some groundstone artifacts, such as charmstones, were ceremonial in nature. The presence of sandstone implements and fire-cracked rock (cooking stones) indicate that food processing activities, mainly with plant materials, were being carried out.

Groundstone artifacts were shaped by pecking and grinding. Mortars were used in conjunction with pestles to reduce acorns or seeds to a mush-like material which could then be further processed. The mortars and pestles often displayed polishing due to wear from grinding. There are many types and sizes of mortars. The portable, bowl mortars sometimes had irregularly shaped exteriors, but in other instances they were bowl shaped and had symmetrical exterior forms. Metates have a flatter grinding surface than mortars, often having the appearance of an elongated dish or slap. Like the mortars, metates were used for the grinding of food materials, especially hard seeds. The shape of a metate, however, is more like the shape of the original rock, having one smooth side. Materials were ground upon the metates with manos, hand-sized cobbles with one or more flattened surfaces. These were selected for their appropriate dimensions and qualities, and often retained the original form of a river cobble. Slight modification occurs on one or more sides where the mano had been ground flat. This shape is complementary to the face of the metate, whereas the cylindrical shape of the pestle corresponds to the bowl mortar. The presence of groundstone materials indicates that food was brought back to a site, processed, and consumed by the inhabitants.

Groundstone artifacts may appear spread throughout an archaeological site or in concentrations within a site. Many fragmented mortars, pestles, manos, and metates, as well as some complete specimens, were deposited in the midden of the Guadalupe Corridor sites. Groundstone artifacts, usually non-fragmented, are placed with burials as grave offerings. Excavations at the Guadalupe Corridor sites recovered groundstone in some cases from the general midden and in other cases in association with the burials. Many of the groundstone artifacts at the six major sites have not been identified as to their specific type and characteristics or were too fragmentary to be identified. This limits a thorough comparison of the use of groundstone artifacts in the Guadalupe Corridor, however it is possible to discuss general trends evident in the data. The following table presents the numbers of five major types of groundstone artifacts recovered from the six major sites in the Corridor.

#1104f

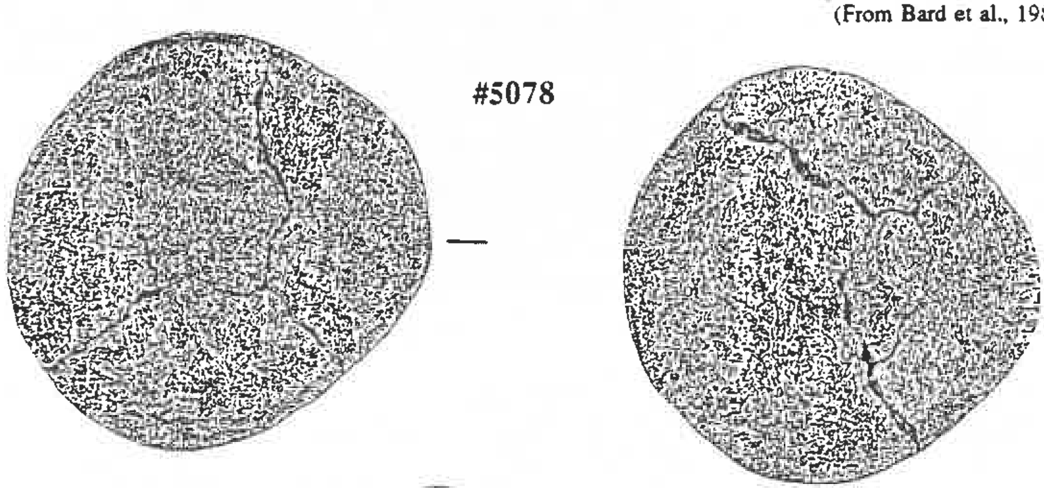


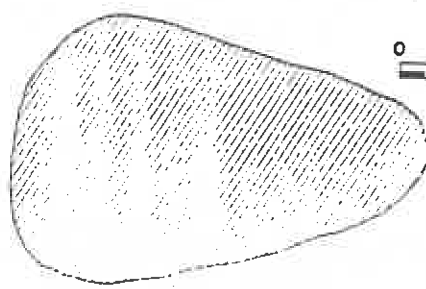
CA-SCI-137

0 cm 3

(From Bard et al., 1986)

#5078



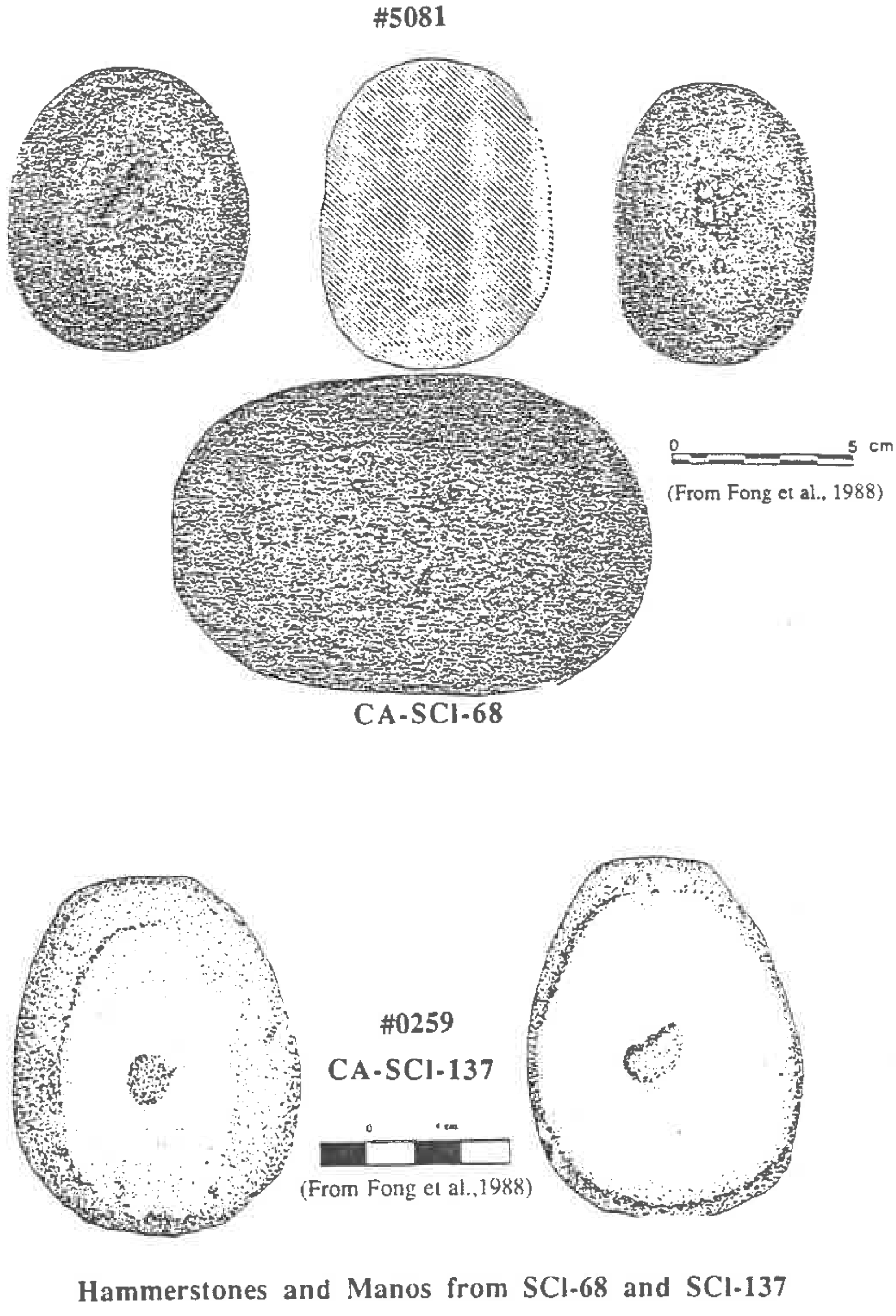


0 5 cm

(From Fong et al., 1988)

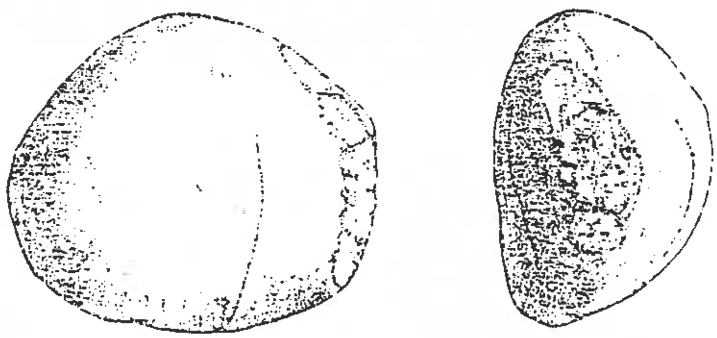
CA-SCI-68

Hammerstones and Manos from the Guadalupe Corridor (selected examples)



Hammerstones and Manos from SCl-68 and SCl-137

#433

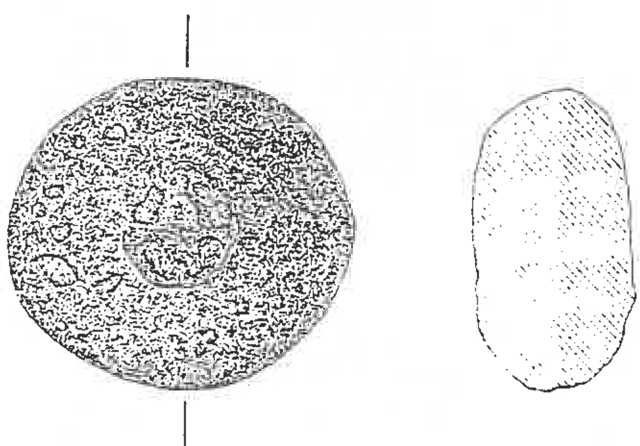


CA-SCl-68

0 4 cm.

(From Bard et al., 1985)

#121

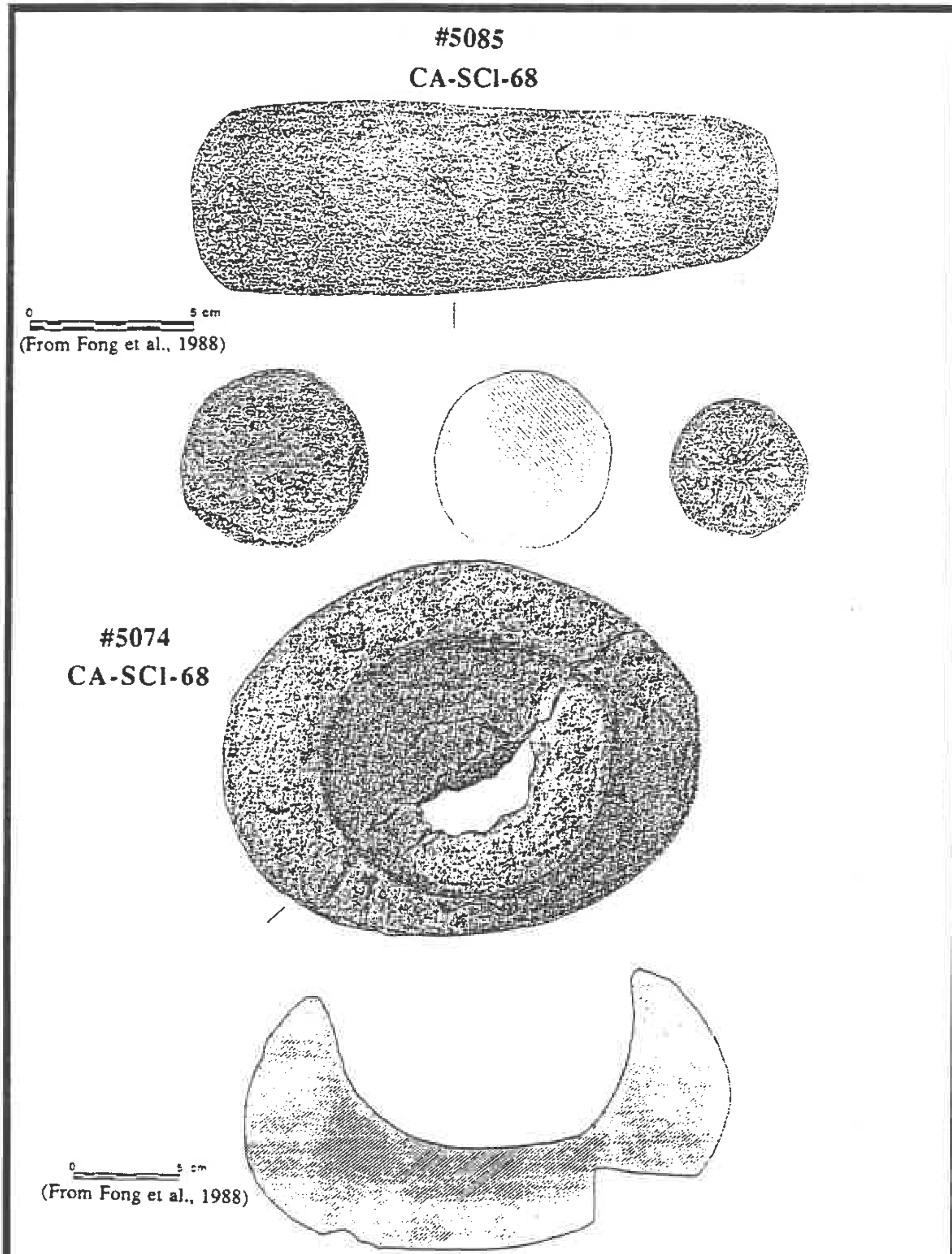


(From James et al., 1988)

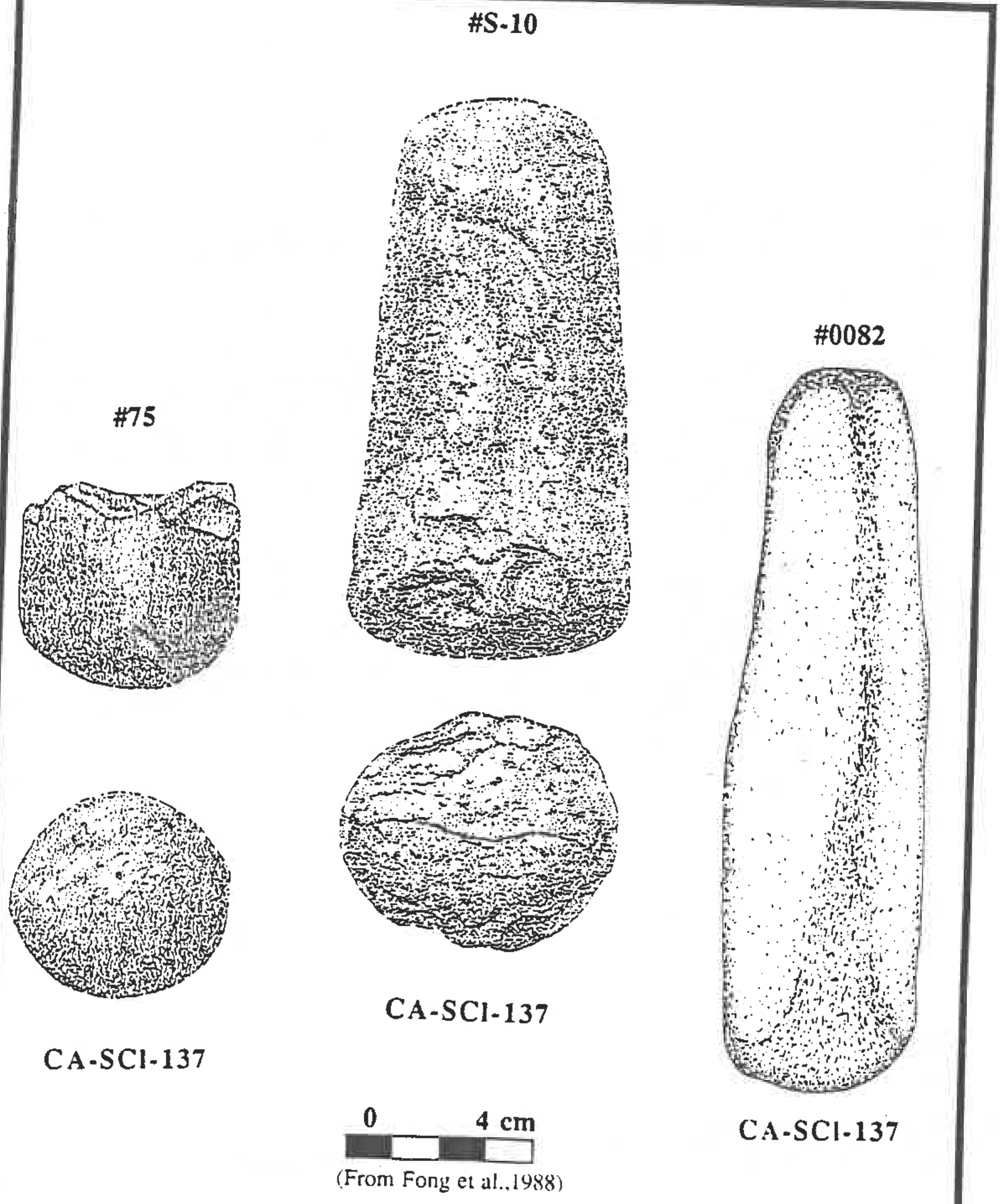
CA-SCl-128

0 cm 5

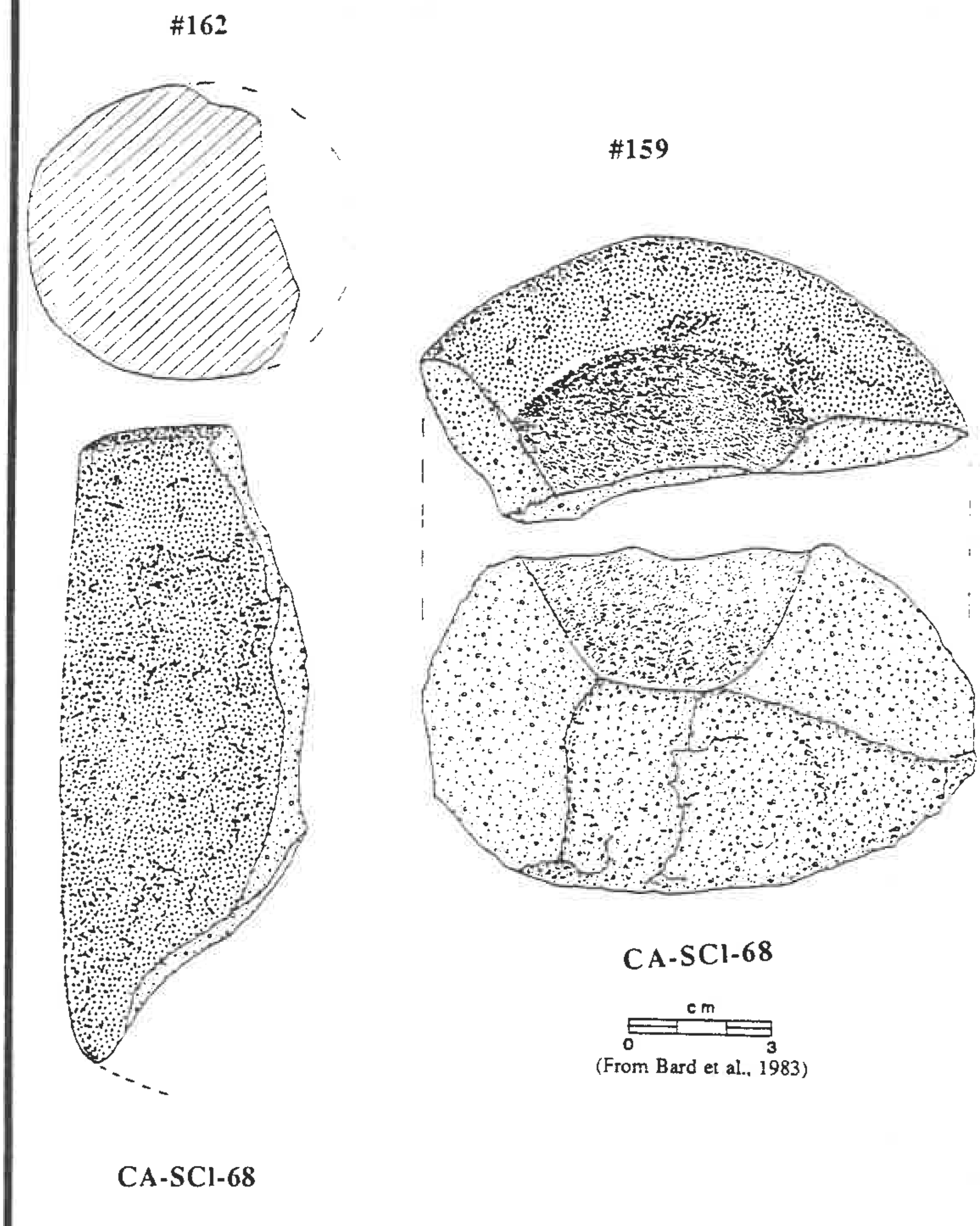
Hammerstones and Manos from SCl-68 and SCl-128



A mortar and pestle from SCl-68

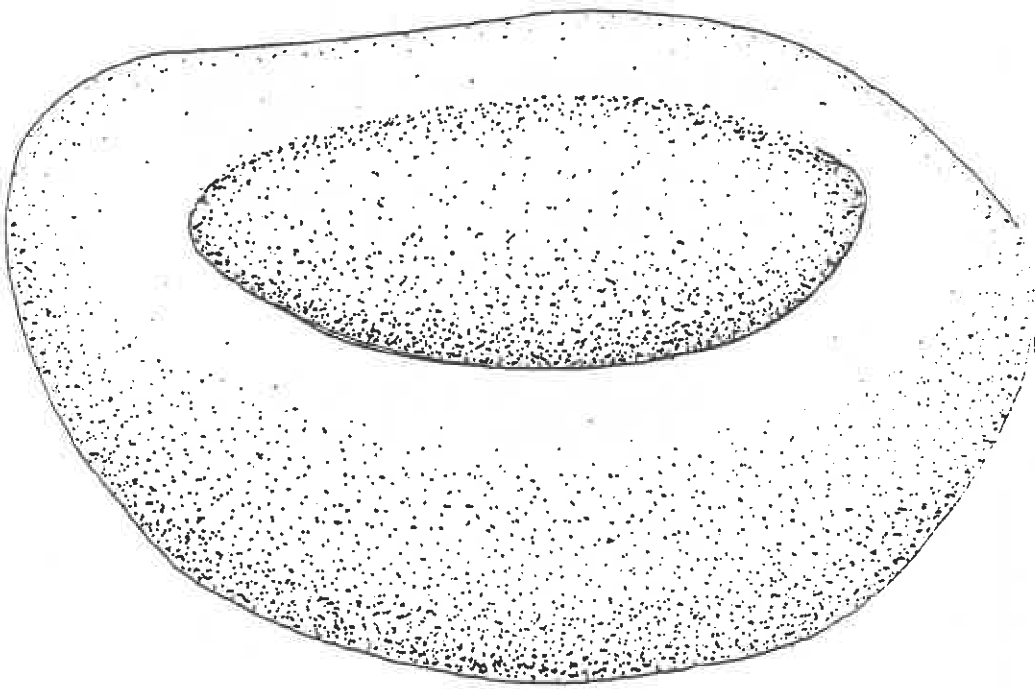


Pestles from SCI-137 (selected examples)



Mortar and Pestle fragments from SCl-68

#5466

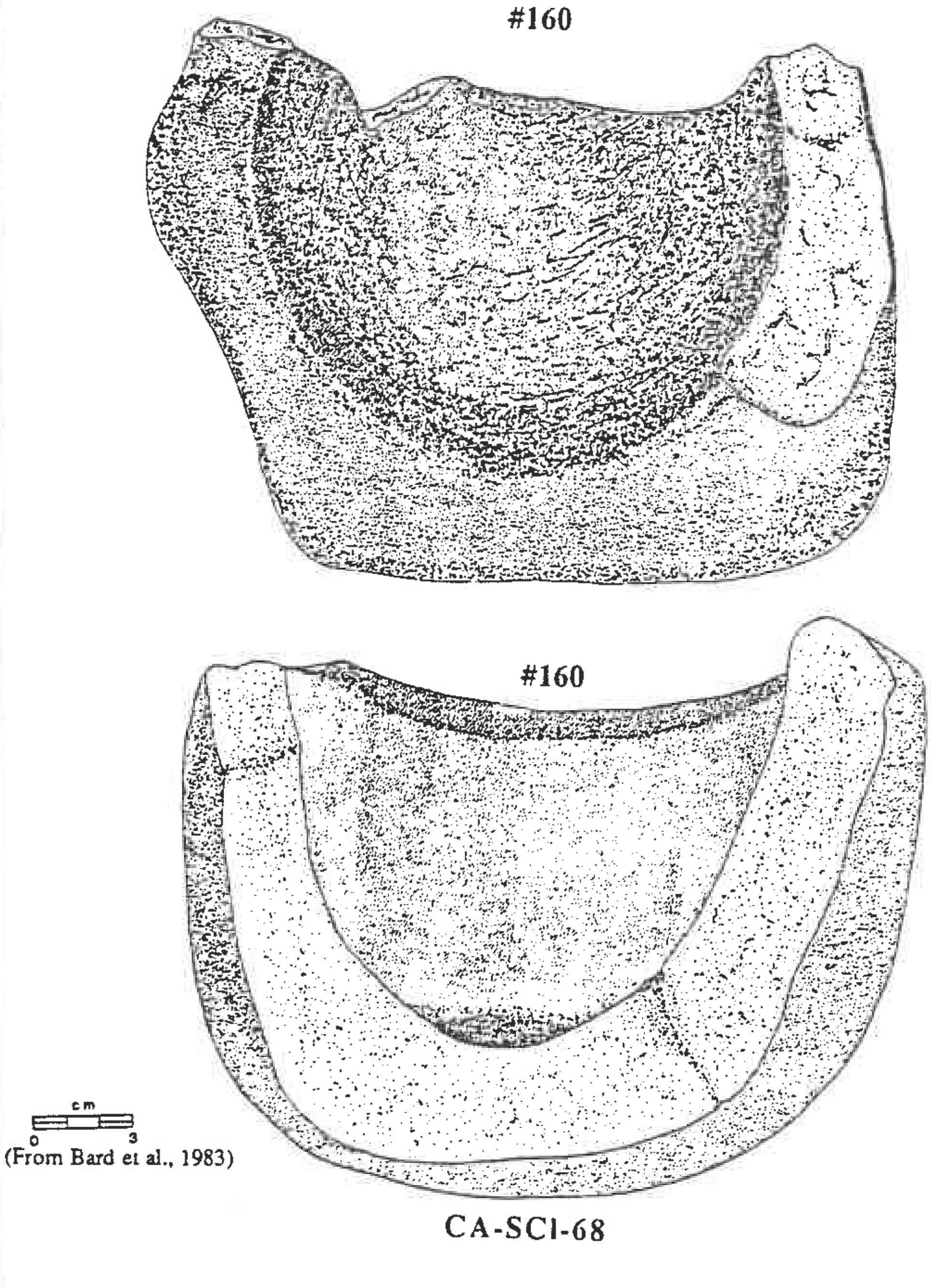


CA-SCI-68

0 4 cm

(Drawn by J. Reddington)

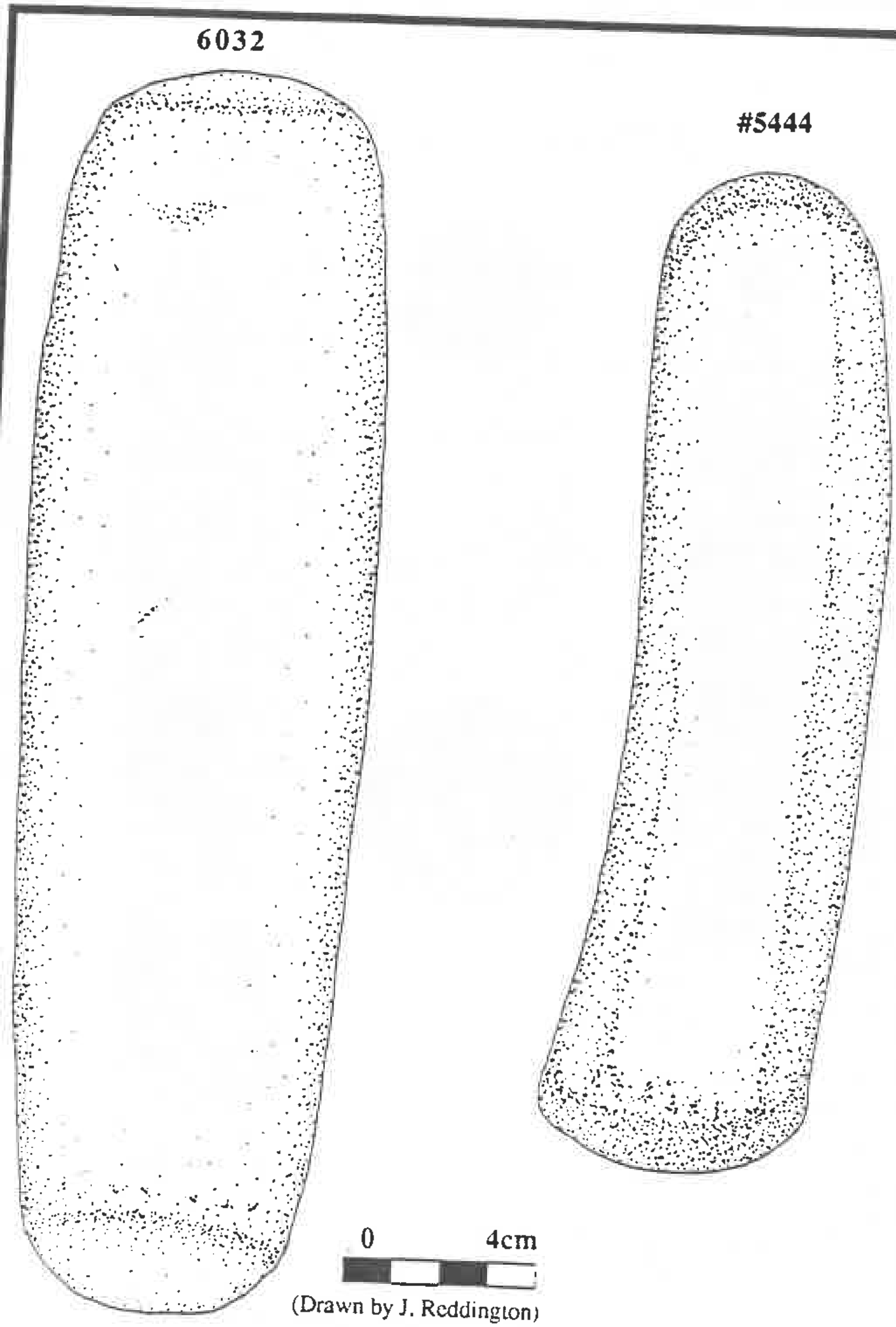
A Mortar from SCI-68



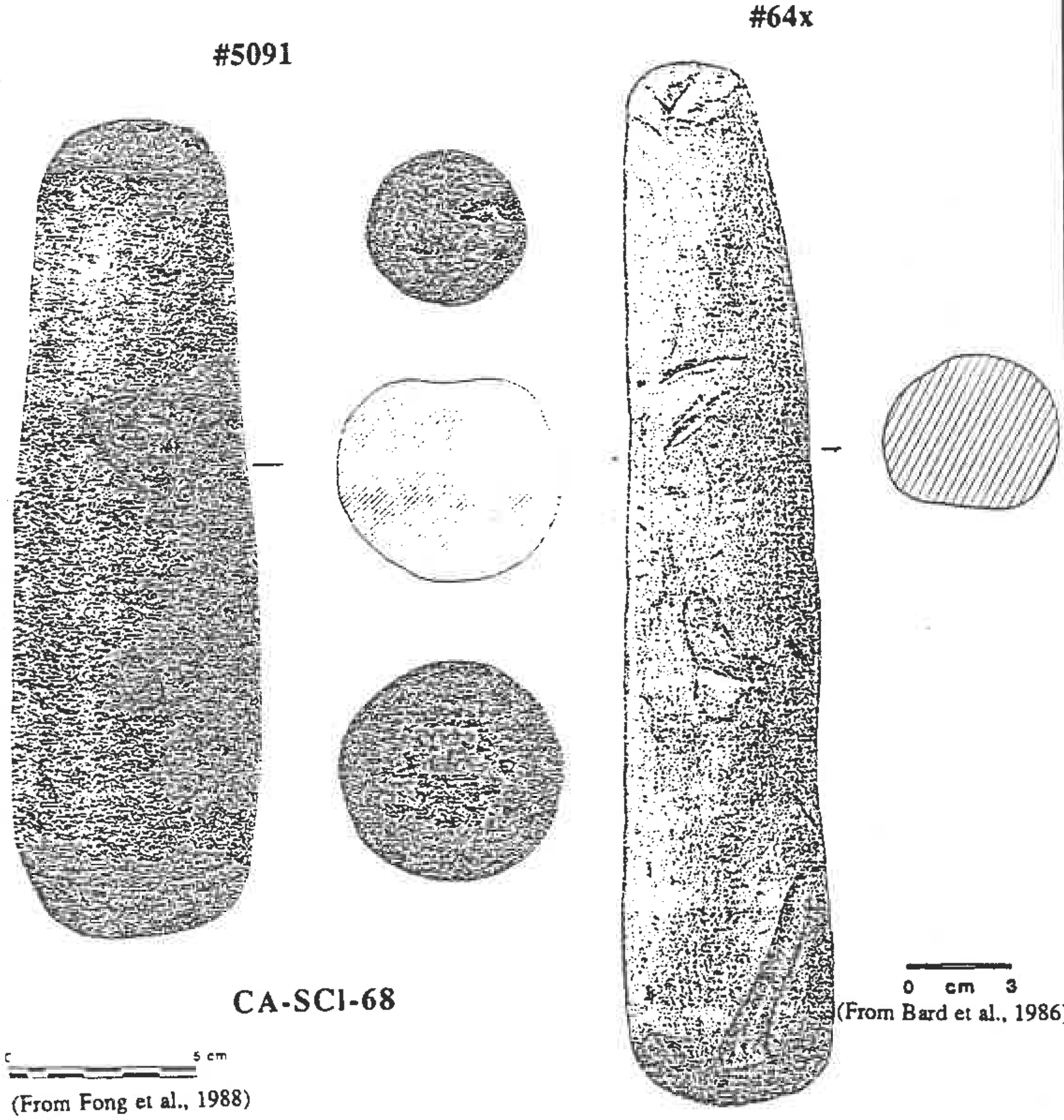
(From Bard et al., 1983)

CA-SCl-68

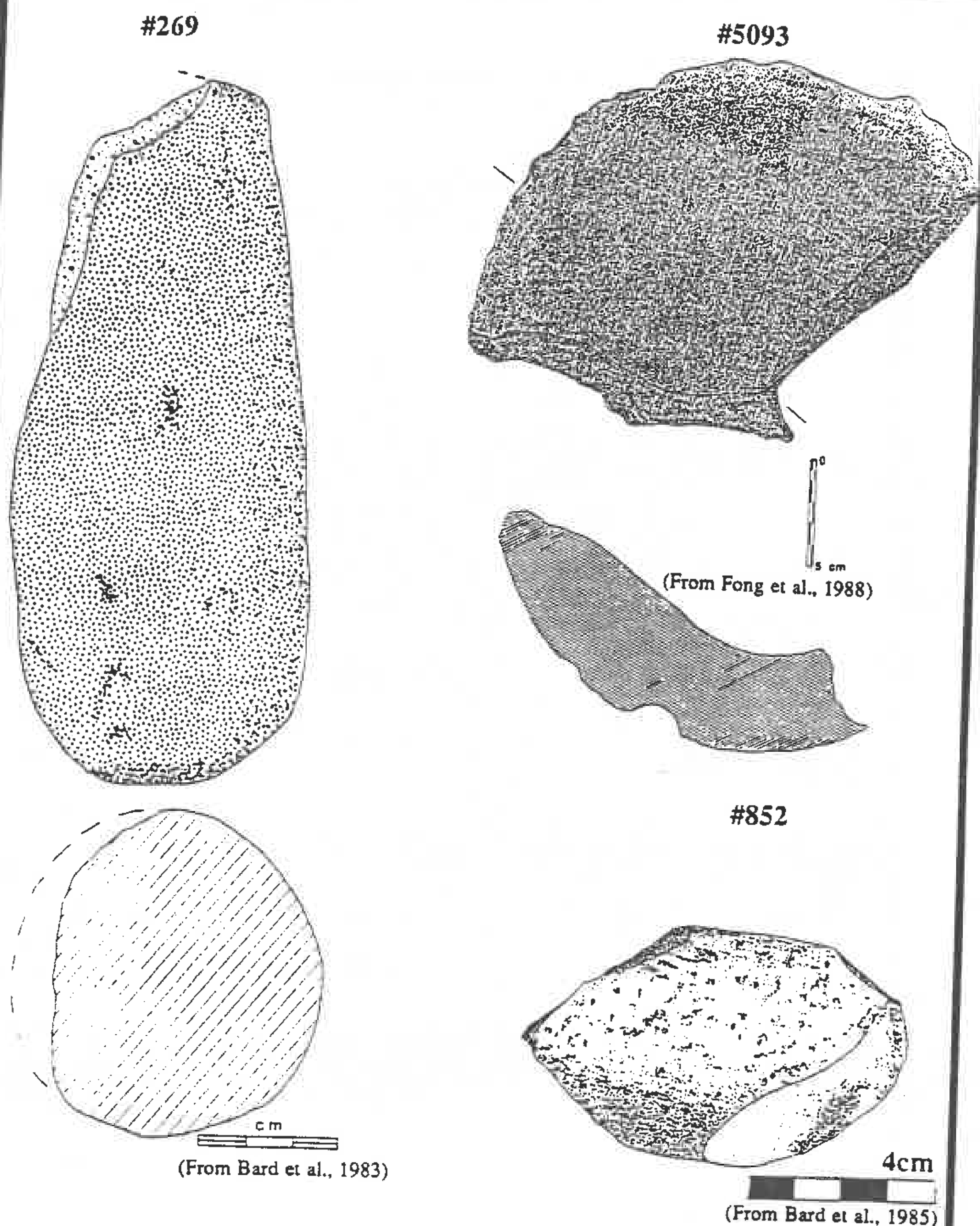
A Mortar from SCl-68



Pestles from SCl-68

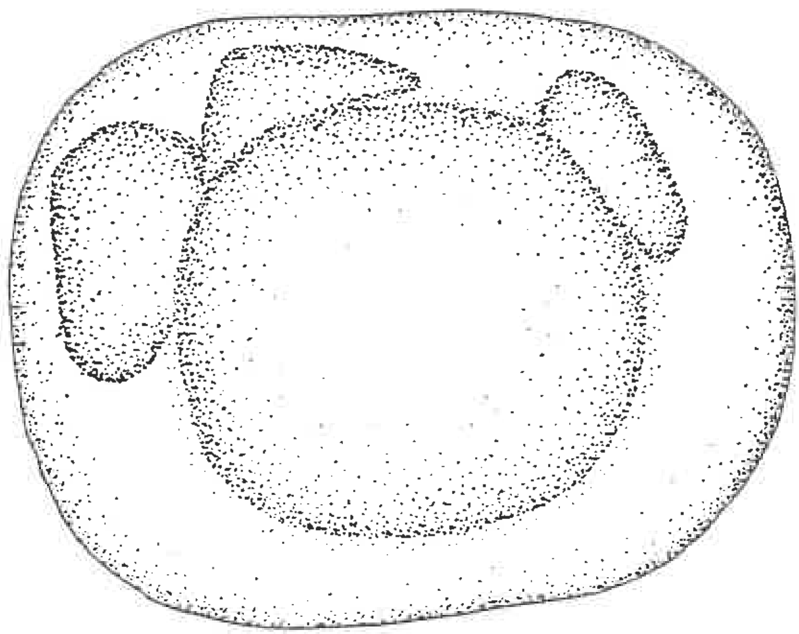


Pestles from SCl-68 and SCl-137

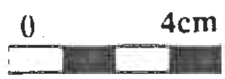


Mortars and Pestles from the Guadalupe Corridor

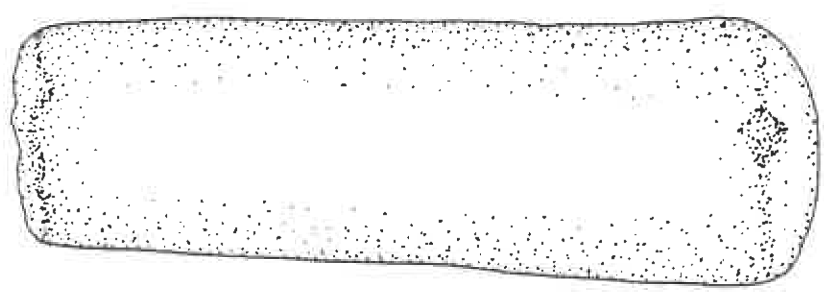
#6067



CA-SCI-68



#5455

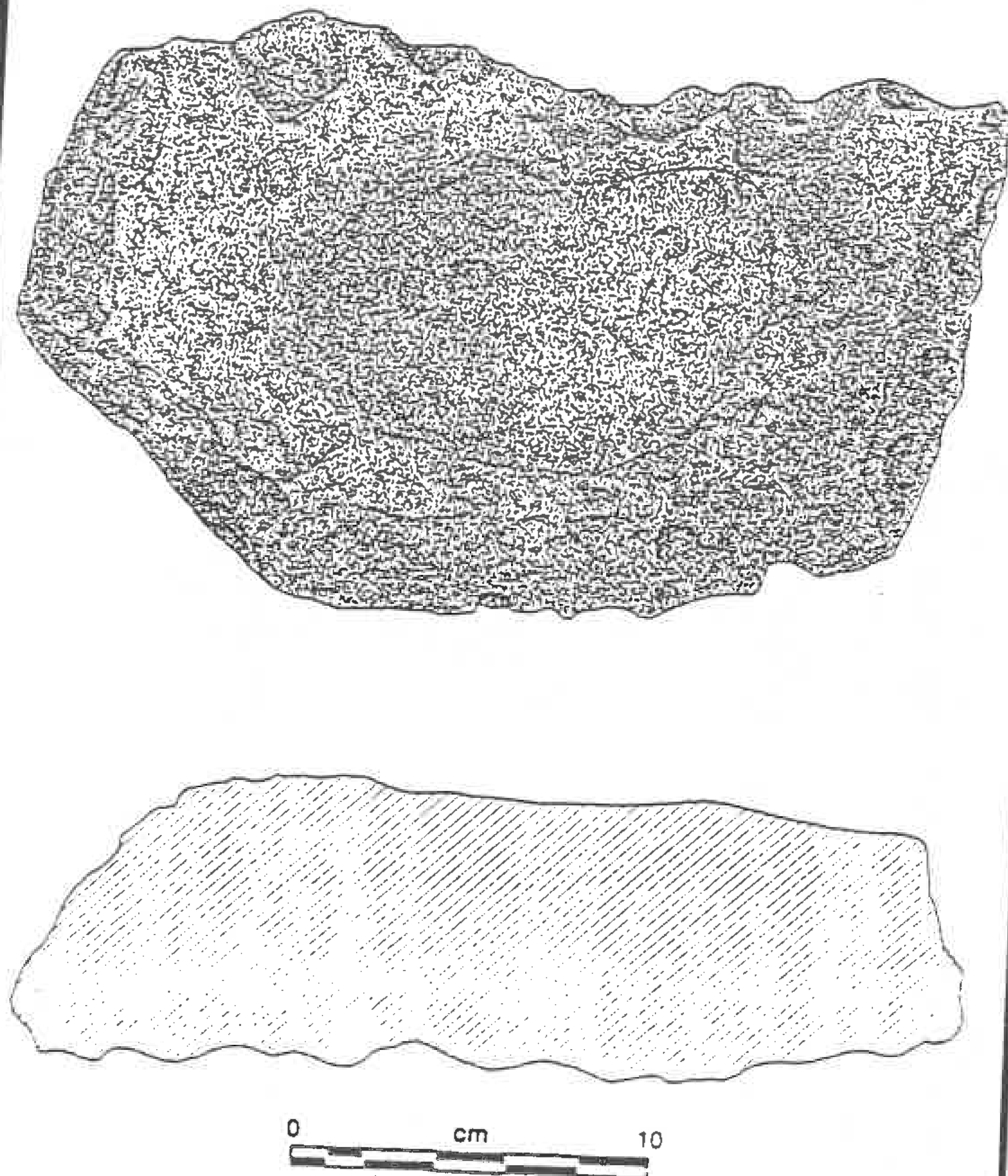


CA-SCI-68

(Drawn by J. Reddington)

A mortar and pestle from SCI-68

#113

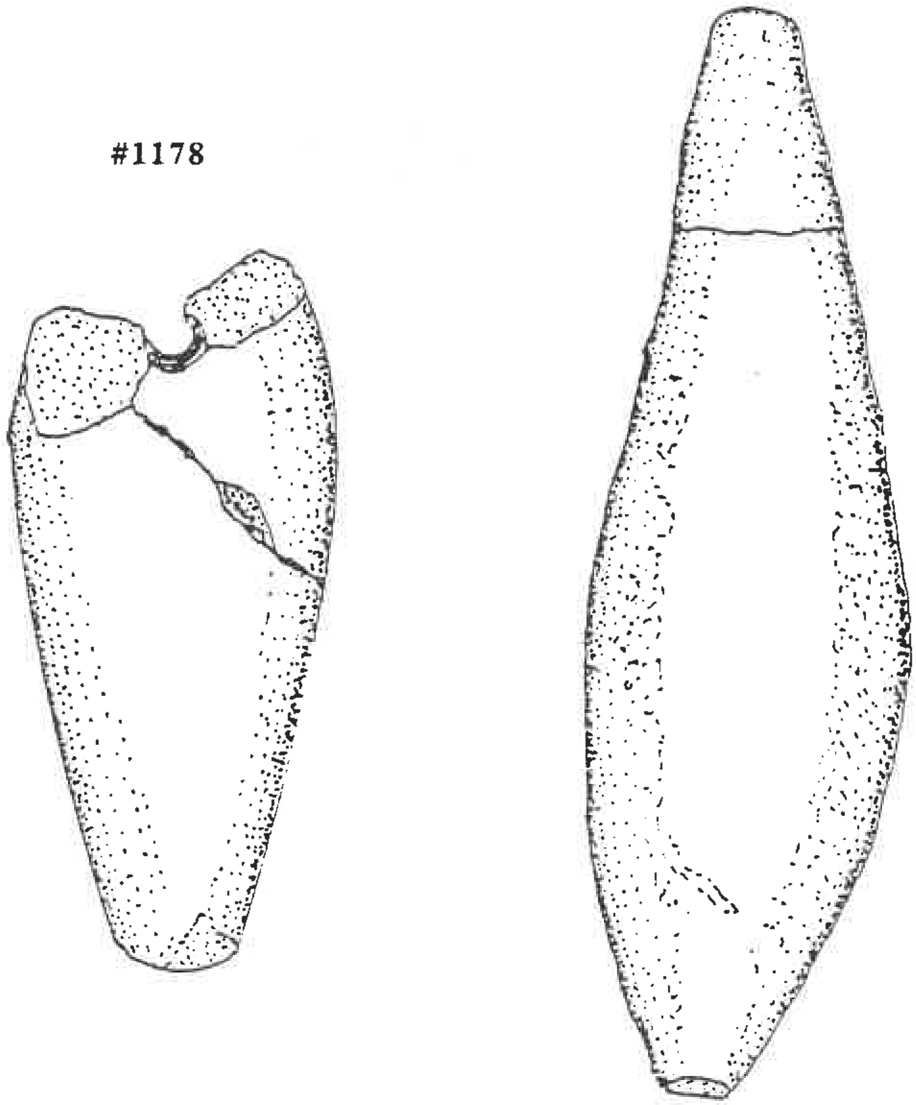


(From James et al., 1988)

Metate from CA-SCI-128

#1177

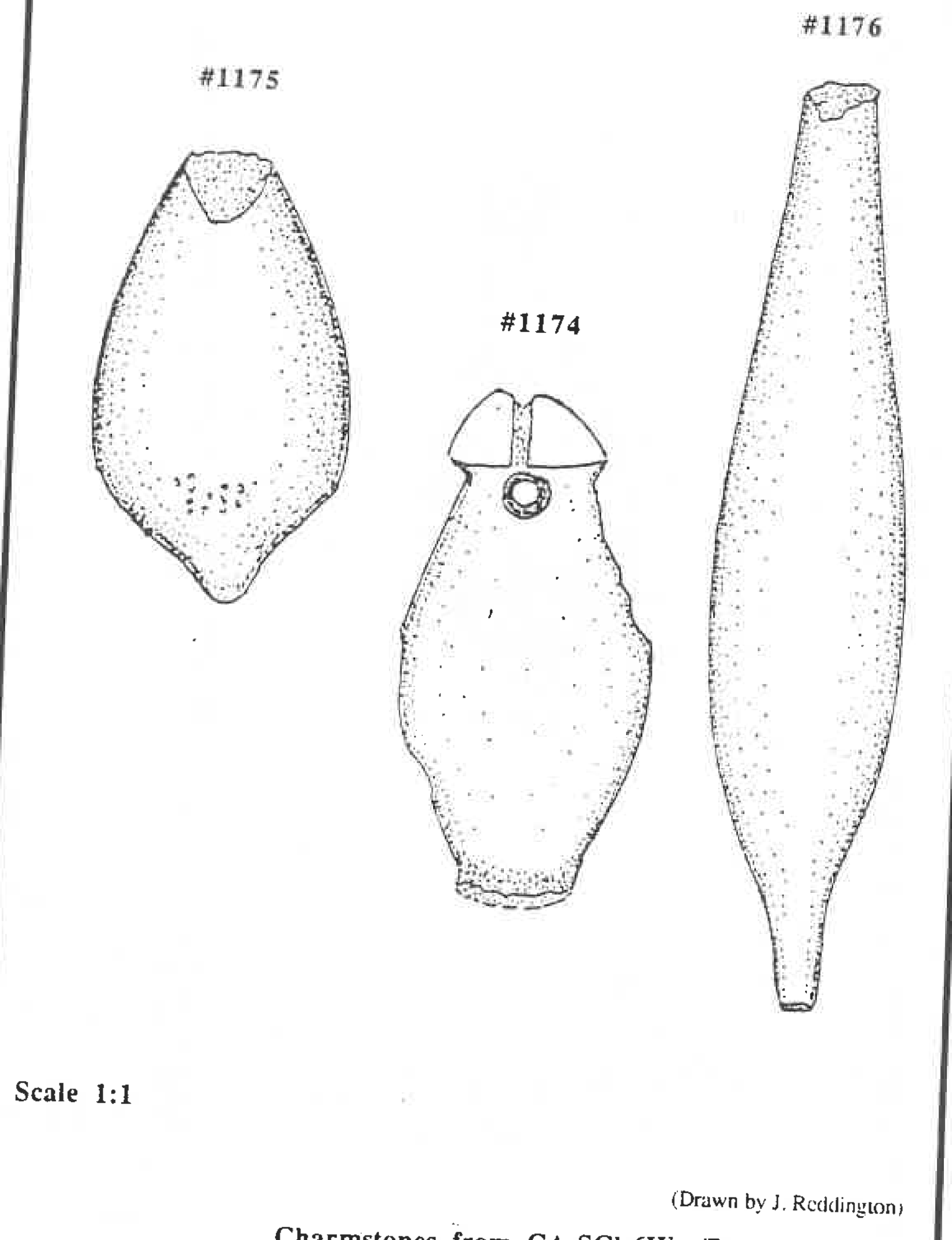
#1178



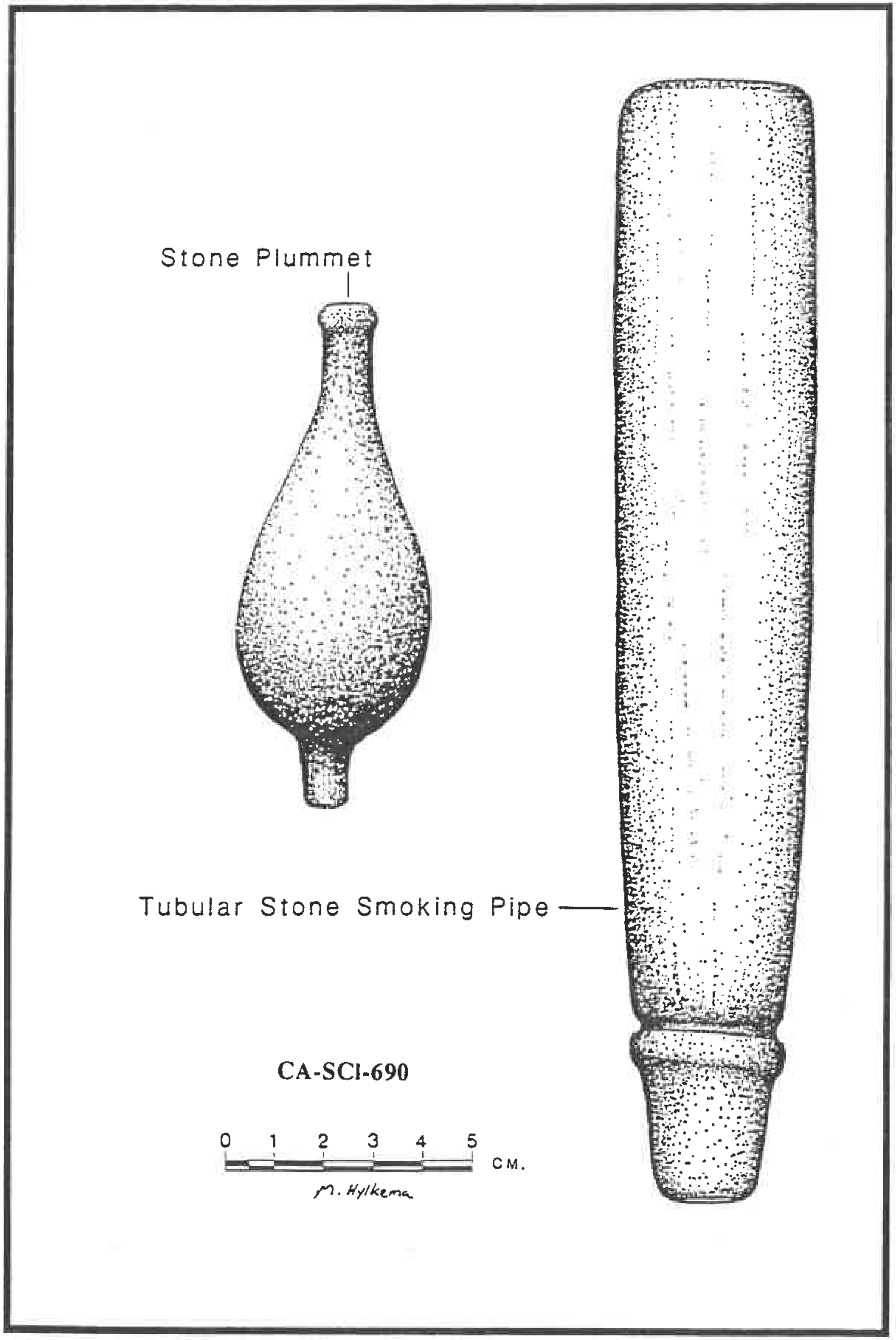
Scale 1:1

(Drawn by J. Reddington)

Charmstones from CA-SCl-6W (From Cartier, 1990)



Charmstones from CA-SCl-6W (From Cartier, 1990)


Stone Plummet
Tubular Stone Smoking Pipe
CA-SCI-690
0 1 2 3 4 5
CM.
M. Hylkema

Groundstone Artifacts

Site	Mortars	Pestles	Manos	Metates	Charmstones	Other or Unidentified	Total
6	4	4	2	0	3	13	13
68	18	33	6	4	0	10	71
128	7	28	0	1	1	21	51
137	41	25	26	5	0	21	118
300/ 302	8	8	1	1	5	143	166
690	9	29	0	0	6	92	136

It is interesting to note that SCl-6, which had the largest burial population of the six sites (139 burials), contained the fewest groundstone artifacts. SCl-300/302, which had the smallest burial population (28 burials), had the largest number of recovered groundstone artifacts. This may indicate significant differences in subsistence practices at the two sites. Another explanation of the contrast may involve the different ages of the site with more emphasis on groundstone at earlier times. More likely, however, the data indicate differences in the burial practices between the two sites, since the vast majority of these groundstone artifacts were recovered from burial lots. Because the two sites are so close together, these data may mark a chronological shift in burial practices. The inhabitants of the earlier SCl-300/302 commonly included groundstone artifacts in their grave offerings, whereas the inhabitants of the later SCl-6 did not do so as often. Again, however, the different data recovery methods and classification systems make these observations tentative.

It is also interesting to note the absence of charmstones from SCl-68 and SCl-137, the two sites from the Santa Teresa Division, and the two earliest dated sites. The number of these clearly symbolic types of artifacts recovered from all of the sites is exceedingly small, and thus the patterning may be the result of sample size; however, it may prove fruitful to pay attention to the provenience and dating of charmstones in future research in the Santa Clara Valley.

Chipped Stone

The most common lithic artifacts found in Santa Clara Valley sites are of chipped stone. Some types of rock, when broken in a certain way, fracture into useful shapes with sharp edges. These chipped stone "flakes" can then be further modified into useful tools such as projectile points, scrapers, knives, and drills.

The vast majority of chipped lithics in the Santa Clara Valley are fashioned from two main types of rock: chert and obsidian. Chert is a category of cryptocrystalline rock with a high silica content found in a wide variety of colors and qualities. Franciscan chert is the type naturally found in the valley with the closest bedrock exposures to the Guadalupe Corridor found in the local East Foothills and the Santa Teresa Hills. Obsidian, a black volcanic glass, comes from the more distant sources of the Napa Valley and in the eastern Sierras.

Although obsidian was not as easily obtained as chert, its superior sharpness and predictable fracturing qualities made it a highly valued material in the Bay Area.

All of the sites investigated in the project area contained substantial amounts of chipped stone tools and the debitage (waste) that is produced in their manufacture. Some of this lithic material was located with burials as grave goods, whereas most of it was found strewn throughout the midden deposits. Analysis of these chipped stone artifacts can provide insights into many aspects of site usage and prehistoric economy. An area with a large amount of stone tools and debitage, for instance, is generally considered to be a location where tool production occurred. Analysis of the raw materials used at sites can often shed light on regional trade networks. The types of tools found at a particular site can indicate the specific economic activities that occurred there, such as food and hide preparation or game hunting. Finally, certain bifaces are stylized enough to be chronologically diagnostic, although in the Santa Clara Valley lithic artifacts are usually limited to only indicating general temporal trends, and do not usually denote specific time periods.

The following chart lists the chipped stone artifacts found at the six major sites in the Guadalupe Corridor by morphological type. Different classificatory schemes and the lack of volumetric control in many of the recovery programs prevent a detailed comparison of these data. The figures from SCl-128 and SCl-690 are of particular interest. It would appear that the large volume of midden screened at SCl-128 resulted in great amounts of chipped lithics. At SCl-690, the data available for inclusion in this report were very preliminary, and the further analysis of the chipped lithics listed under flakes will probably yield additional formal tools. Following the summary chart is a brief description of the major classes of chipped stone artifacts found in the sites in the Corridor.

Chipped Stone Artifacts

Site	Bifaces	Unifaces	Other Tools	Cores	Waste Flakes	Total
6	24	9	11	5	51	100
68	10	3	18	14	423	468
128 †	61	126	1694	510	3283	5674
137	19	46	4	19	187	275
300/302	16	2	27	12	623	680
690 ††	31	0	1	0	6794	6826

† The sample from SCl-128 comes from a mixture of midden and burial deposits.
†† Data from SCl-690 are preliminary: lithic analysis has not yet been completed.

Bifaces

Often called a point, projectile point, knife, or "arrowhead," bifaces are symmetrically flaked on both sides to form sharp and even edges. The manufacture of a biface is a time consuming and difficult process, and thus these tools are highly valued. Some were used as knives for cutting and slicing. Most, however, were projectile points that were notched and hafted to wooden shafts. In the Guadalupe Corridor, the majority of these projectile points were made of obsidian, and (with the exception of one specimen) all the projectile points which appear to have been used in warfare were made of obsidian. The predominance of obsidian in the bifaces of the Guadalupe Corridor almost certainly results from the focus on burial recovery and the importance of obsidian in the prehistoric cultures.

Unifaces

Unifaces are flaked off a core and retouched on only one side. These tools often serve as knives or scrapers.

Cores

Cores are nodules, or cobbles, of knappable stone struck to produce smaller, sharp flakes. Exhausted cores have been reduced so that they cannot be knapped any further. Core fragments are regarded as the remnant of a larger core.

Other Tools

There are many stone tools which do not readily fall into the categories of biface and uniface. Utilized flakes are flake tools that have been employed for tasks involving cutting and/or scraping, and then discarded. Consequently, these flakes do not possess obvious retouch sharpening along their working edges, but often have evidence of use/wear on one or both edges. Retouched flakes have pressure flaking scars along the edge of the artifact that have been modified to help sharpen or further shape the piece. Thinning flakes can be classified as debitage that has been flaked off in the process of thinning or reforming a stone tool such as a projectile point.

Debitage/Waste Flakes

Debitage is the chipping debris formed as a by-product of stone tool manufacturing. Another by-product of this process is thinning flakes. Thinning flakes are derived from soft hammer percussion and can be considered a subcategory or specialized type of secondary flake. They are typically longer than they are wide with the intended purpose of reducing the thickness of a flake blank or biface to a more finished form.

Biface Discussion

Bifacial stone tools are often considered to be the most important class of stone artifacts in studies of prehistoric North America. G. Fenenga elaborates elegantly that "The biface class is of particular importance because of the widely held belief that it is the most 'diagnostic' form of artifact for identifying the temporal placement and cultural identity of lithic assemblages" (1987: 79). In addition, the distribution of tools made of a given source material may contribute to the elucidation of prehistoric trade routes. Also, the appearance of regularized forms in regional contexts may provide evidence of exchange in finished products, or perhaps a degree of craft specialization among certain groups. For all of these reasons, a detailed treatment of the bifaces recovered from sites in the Guadalupe Corridor is necessary.

The first step in any analysis of bifaces must be an attempt to classify the observed morphological variability in the biface sample, and to this end many classification schemes have been proposed for various regions of California. The most widely utilized and earliest local classification is that of Lillard, Heizer, and Fenenga (1939), which was derived using data from the Central Valley. An initial attempt was made to classify the Guadalupe Corridor biface sample according to their system. Unfortunately, their classification appeared to obscure certain aspects of the Guadalupe data, and therefore it was felt that a different scheme

should be utilized. What resulted is a classification based on a generalized series of morphological attributes, much like that developed by Fenenga (in Cartier 1987) for the Scotts Valley Site. Greater attention was given to morphological characteristics than to strict measurement, on account of the dangers involved in classification schemes that do not account for metric variation and idiosyncrasy. Such a technique involves a fair amount of subjective discrimination, but an attempt was made to rely on the general classes proposed in other recent and classic typologies (Lillard, Heizer, and Fenenga 1939; Thomas 1970; Fenenga 1987; Brown and Jones 1989).

The inventory and classification of bifaces recovered from the Guadalupe Corridor is presented below. Raw material data are included, in the hope of obtaining a more accurate estimation of raw material frequencies. Also, the bifaces that are illustrated in this report are noted in the far right column. The classification scheme is followed by an explanation of each of the type-categories (Reference to the Central California Taxonomic System classification of Lillard, Heizer, and Fenenga (1939) is also included in parentheses where applicable for the sake of comparison).

Biface Inventory

KEY: DSN=Desert Side Notched, SSL=Serrated Lanceolate,
STL=Straight Lanceolate, LL=Leaf-Shaped Lanceolate, LLB=Leaf Lanceolate Bipoint,
CS=Contracting Stem, SS=Square Stem, ?=Insufficient data for classification.

Catalog Number	Classification	Raw Material	Illustrated
CA-SCl-6-107j	Fragment	Obsidian	No
CA-SCl-6-123	?	Obsidian	No
CA-SCl-6-141	?	Obsidian	No
CA-SCl-6-492	?	Obsidian	No
CA-SCl-6-509	LLB (NAa)	Obsidian	Yes
CA-SCl-6-646	?	Obsidian	No
CA-SCl-6-647	LL (NAb2)	Obsidian	Yes
CA-SCl-6-710	?	Obsidian	No
CA-SCl-6-713	Fragment	Obsidian	No
CA-SCl-6-774	Fragment	Obsidian	No
CA-SCl-6-798	LL (NAb2)	Obsidian	Yes
CA-SCl-6-833	Fragment	Obsidian	No
CA-SCl-6-880	?	Obsidian	No
CA-SCl-6-881	?	Obsidian	No
CA-SCl-6-955	?	Franciscan chert	No
CA-SCl-6-1151	?	Obsidian	No
CA-SCl-6-1179	LL (NAb2)	Obsidian	Yes
CA-SCl-6-1180	? (NAb1)	Obsidian	Yes
CA-SCl-6-1181	LL (NAb2)	Obsidian	Yes
CA-SCl-6-1182	LL (NAb2)	Obsidian	Yes
CA-SCl-6-1183	LL	Obsidian	Yes
CA-SCl-6-1205	?	Franciscan chert	No
CA-SCl-6-1232	?	Obsidian	No
CA-SCl-6-1239	?	Obsidian	No
CA-SCl-68	DSN	Not Given	No
CA-SCl-68-195	LL	Obsidian	Yes
CA-SCl-68-854	Fragment	Monterey-banded chert	No
CA-SCl-68-1005	LL (NAb2)	Monterey-banded chert	Yes
CA-SCl-68-5098	Fragment	Obsidian	Yes
CA-SCl-68-5300	LL (NAa)	Obsidian	Yes

Catalog Number	Classification	Raw Material	Illustrated
CA-SCl-68-5301	?	Obsidian	Yes
CA-SCl-68-5355	LL (NAb2)	Obsidian	Yes
CA-SCl-68-5363	LL (NAb1)	Obsidian	Yes
CA-SCl-68-6026	Fragment	Obsidian	Yes
CA-SCl-137-S-11	CS	Franciscan chert	Yes
CA-SCl-137-76	? (NAb1)	Obsidian	Yes
CA-SCl-137-97	?	Monterey-banded chert	Yes
CA-SCl-137-367	SS (SBa)	Franciscan chert	Yes
CA-SCl-137-1084	SS (SBa)	Obsidian	Yes
CA-SCl-300/302-25	CS	Obsidian	No
CA-SCl-300/302-153	CS	Obsidian	Yes
CA-SCl-300/302-170	CS	Franciscan chert	Yes
CA-SCl-300/302-208	DSN	Franciscan chert	Yes
CA-SCl-300/302-231	CS (NAb2)	Franciscan chert	Yes
CA-SCl-690-0008	STL (NAb1)	Obsidian	Yes
CA-SCl-690-0009	Fragment	Franciscan chert	No
CA-SCl-690-0444-1	Fragment	Obsidian	Yes
CA-SCl-690-0470	STL	Obsidian	Yes
CA-SCl-690-0471	Fragment	Franciscan chert	No
CA-SCl-690-0571	SSL (NAb2)	Obsidian	Yes
CA-SCl-690-0613	?	Obsidian	No
CA-SCl-690-0786	SS	Franciscan chert	Yes
CA-SCl-690-0860	Fragment	Obsidian	Yes
CA-SCl-690-0945	SSL (NAb2)	Obsidian	Yes
CA-SCl-690-1365	Fragment	Obsidian	Yes
CA-SCl-690-1204	STL (NAb1)	Franciscan chert	Yes
CA-SCl-690-1224	?	Obsidian	No
CA-SCl-690-1246	?	Obsidian	No
CA-SCl-690-1318	?	Obsidian	No
CA-SCl-690-1443	CS	Franciscan chert	Yes
CA-SCl-690-1444	Fragment	Obsidian	No
CA-SCl-690-1474	?	Obsidian	No
CA-SCl-690-1490	Fragment	Franciscan chert	No
CA-SCl-690-1491	SSL (NAb1)	Obsidian	Yes
CA-SCl-690-1618	Fragment	Obsidian	No
CA-SCl-690-1684	Fragment	Obsidian	Yes
CA-SCl-690-1689-1	Fragment	Obsidian	Yes
CA-SCl-690-1883	SSL (NAb2)	Obsidian	Yes
CA-SCl-690-1897	SSL (NAb2)	Obsidian	Yes
CA-SCl-690-2233	STL (NAb2)	Franciscan chert	Yes
CA-SCl-690-2234-1	STL	Obsidian	Yes
CA-SCl-690-2273	STL (NAb2)	Obsidian	Yes
CA-SCl-690-2288	?	Franciscan Chert	No
CA-SCl-690-2289	?	Obsidian	No
CA-SCl-690-2293	?	Obsidian	No

Explanation of Morphological types
(Presented in Order of Frequency)

Leaf Shaped Lanceolate (12): This is the most abundant type in the Guadalupe Corridor, and is defined by a general leaf-shaped appearance, with fairly regularized thinning flake scars and maximum blade width occurring somewhere above the base and usually in the lowest third of the blade. Hylkema (1991:93) believes that this type may mark a

Transitional Phase between the Middle and Late Periods along the Santa Cruz Coast, and multiple occurrences of this type at SCl-6 appear to support this chronology, although there are a few examples from SCl-68 dated to the Early Phase of the Middle Period.

Contracting Stemmed (6): This type exhibits significant variation in blade morphology, but is nevertheless characterized by stems which have their greatest width at the junction with the blade, and taper as one travels away from this junction. Some of the representatives of this type are barbed.

Straight Lanceolate (6): This type has a long and narrow shape, and a maximum blade width generally right at the base. The proportions are much like the Serrated Lanceolates, but the dimensions are somewhat larger, and the edges lack the serrations which define the following type.

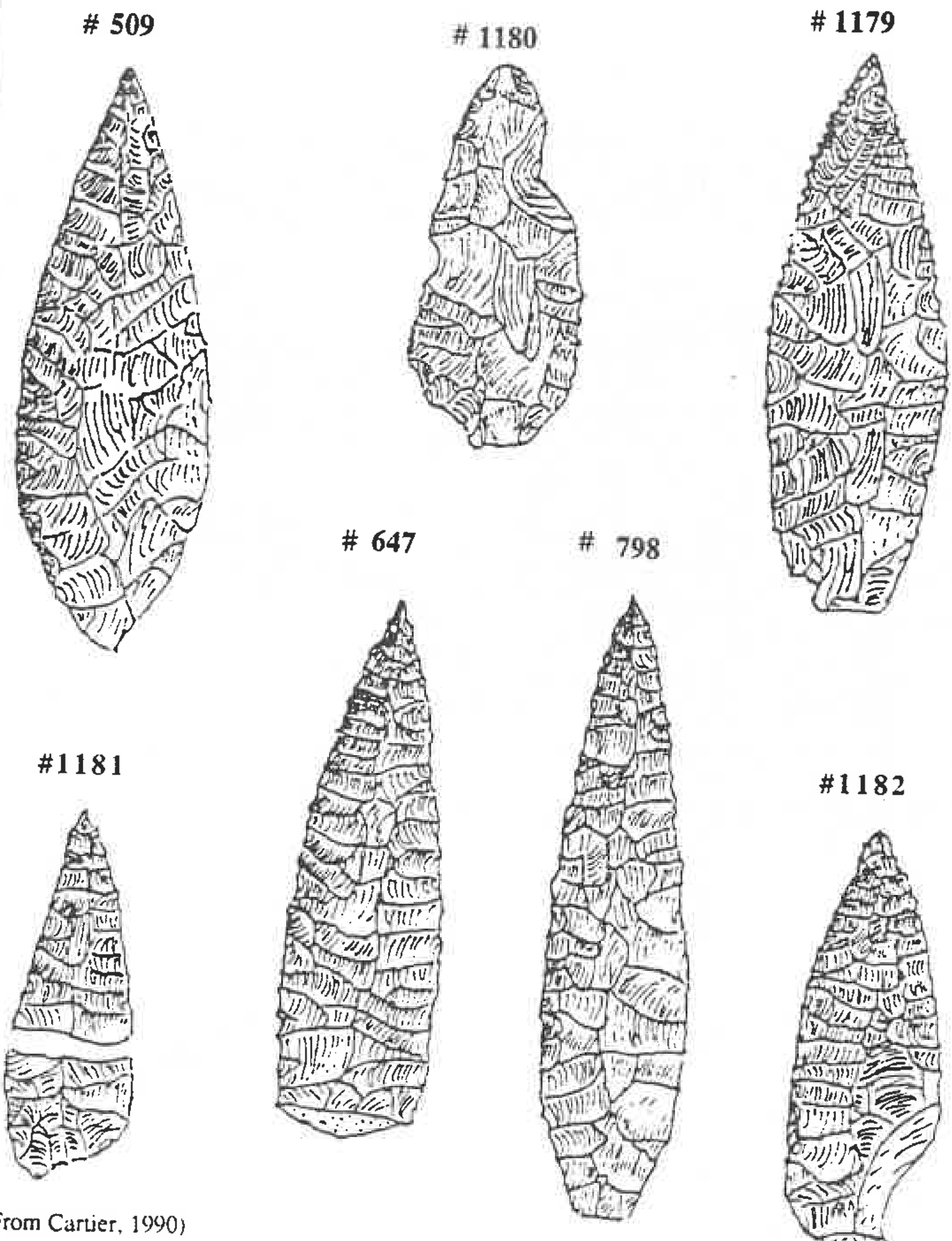
Serrated Lanceolate (5): This type is defined by the existence of serrations along both edges of the blade, running from the base up towards the tip. One of the points which falls into this type (SCl-690: 1491) is definitely of the Stockton Serrated type, as defined by Baumhoff and Byrne (1959). The Stockton Serrated type is considered a good Late Period (especially Phase II) time marker, and is often associated with bow and arrow technology. Its occurrence at SCl-690 is basically consistent with this interpretation, as the deposits there date from the Transitional Middle Period through the Early Phase of the Late Period. The other serrated lanceolates from this site may be related to this form, but even if they are not, they are well defined by the serrated edges, long and narrow shape, and maximum blade width generally right at the base. These points may still have some temporal significance, as Lillard, Heizer, and Fenenga (1939, pl. 24), and Moratto (1984: 213) document the appearance of serrated points during the Late Period in Central California.

Square Stemmed (3): This type is characterized by large, excurvate to triangular shaped blades and square or slightly expanding stems. Square stemmed points have been recovered from contexts dating between 4000 and 1000 B.P. (Cartier 1984; Hylkema 1991), and thus have imprecise chronological significance. Further subclassification of this type into more temporally diagnostic forms may be possible with a large sample, but the small size of the Guadalupe Corridor assemblage prevents this.

Desert Side Notched (2): This type is described by Baumhoff and Byrne (1959), who offer a thorough treatment of Desert Side Notched points. It is one of the most clearly recognizable forms, and is known from numerous sites throughout California and the Great Basin. The body of this type is triangular in outline with flaked straight edges. Its maximum width is at the base, which is concave. The two U-shaped notches that characterize this type are located on either side of the biface about one-third of the length from its base. Desert Side Notched points are usually taken as an indication of the appearance of bow and arrow technology in California, and are generally considered to represent one of the last "pre-contact" place markers in California (Cartier et al. 1980). Its occurrence in the Guadalupe Corridor, in primarily Middle Period deposits, initially appears problematic. However, both examples from the study area are isolated surface finds that seem to bear little relation to the greater deposits. Therefore, their appearance should be taken as evidence of some Late Period activity, but should not be used as evidence to refute the dating of the main occupations of the Guadalupe Corridor sites.

Leaf-Shaped Lanceolate Bipoint (1): This type is similar to the leaf-shaped lanceolates, except for the presence of a pointed base. Only one example of a leaf-shaped bipoint (SCl-6-509) has been found in Guadalupe Corridor excavations.

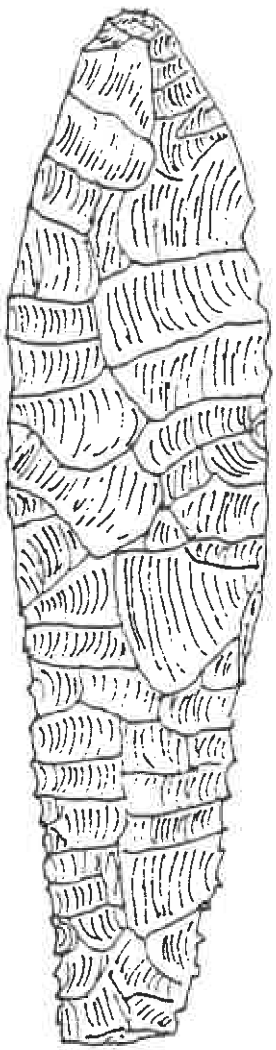
Scale 1:1



(From Cartier, 1990)

Bifaces and Biface fragments from CA-SCl-6

#1183

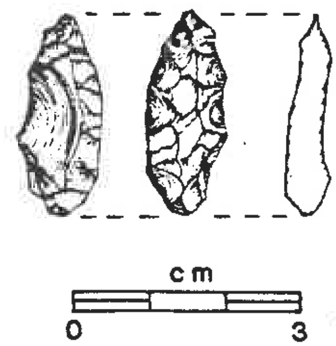


(From Cartier, 1990)

Biface from CA-SCl-6

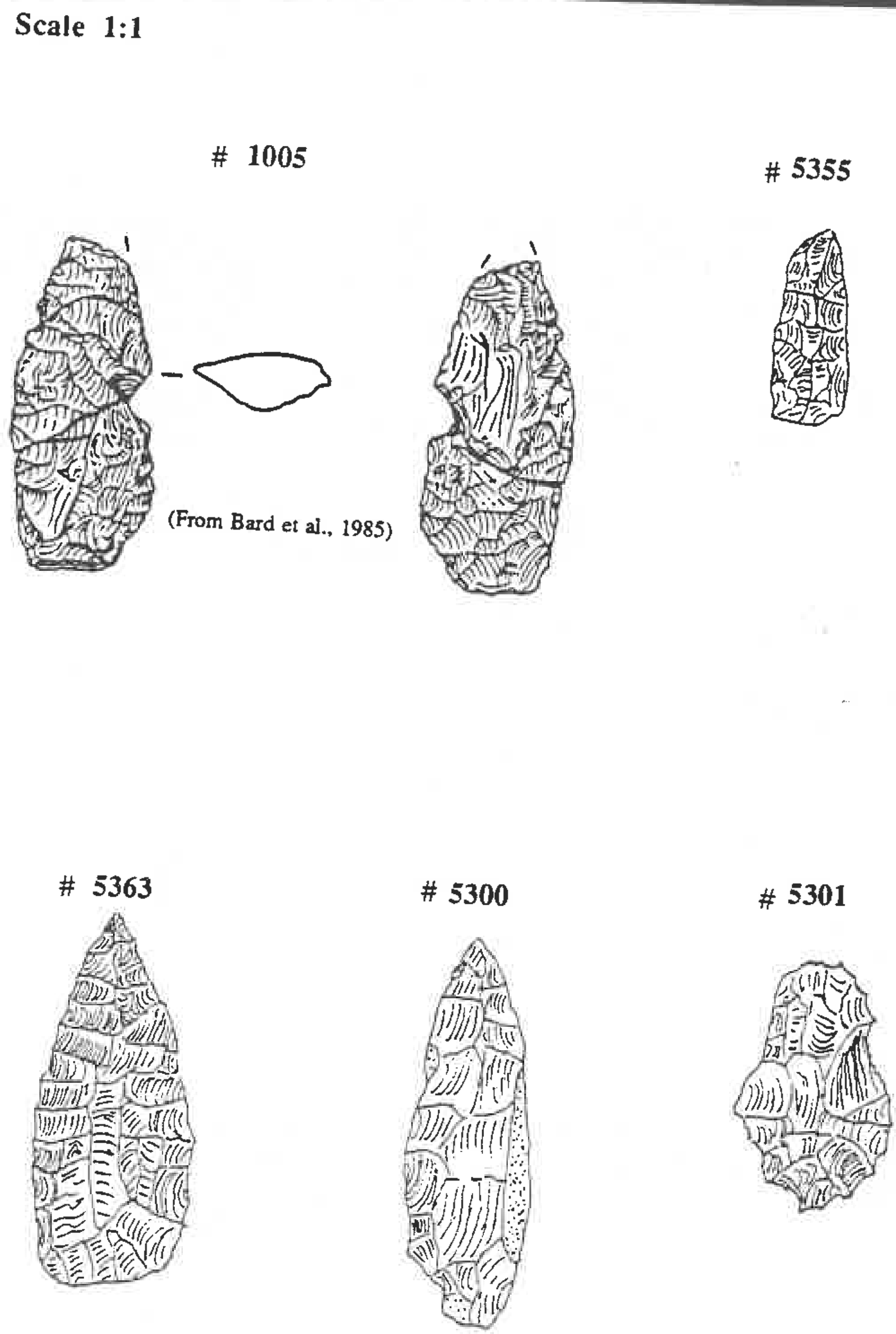
Scale 1:1

#195



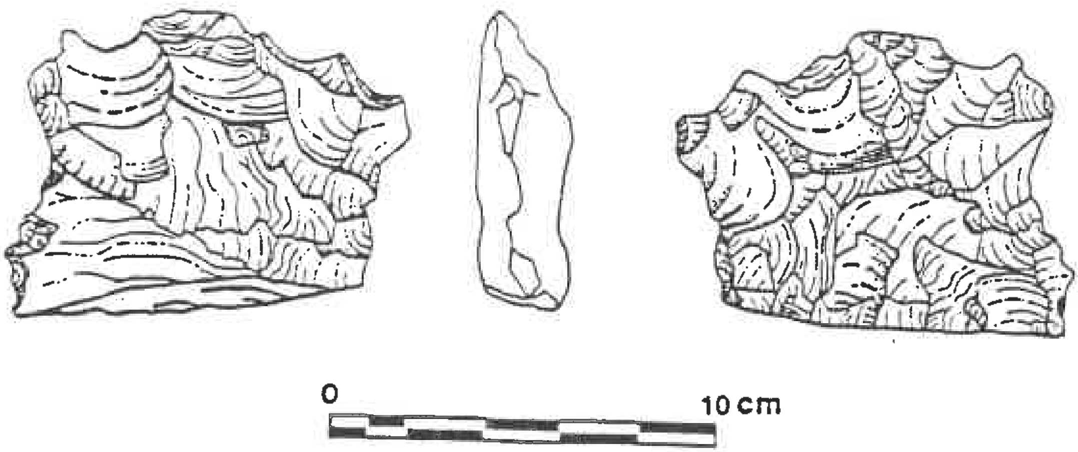
(From Bard, et al., 1983)

Biface from CA-SCl-68



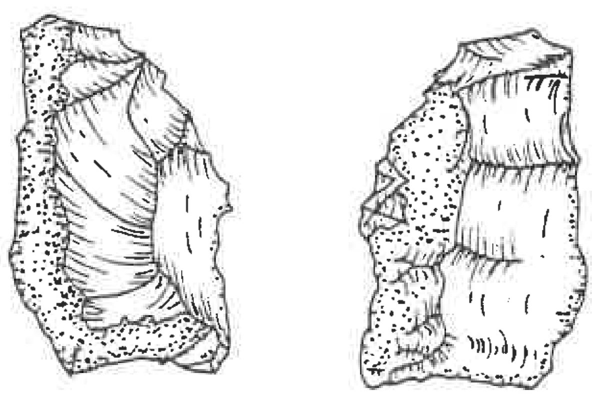
Bifaces and Biface fragments from CA-SCI-68

5098



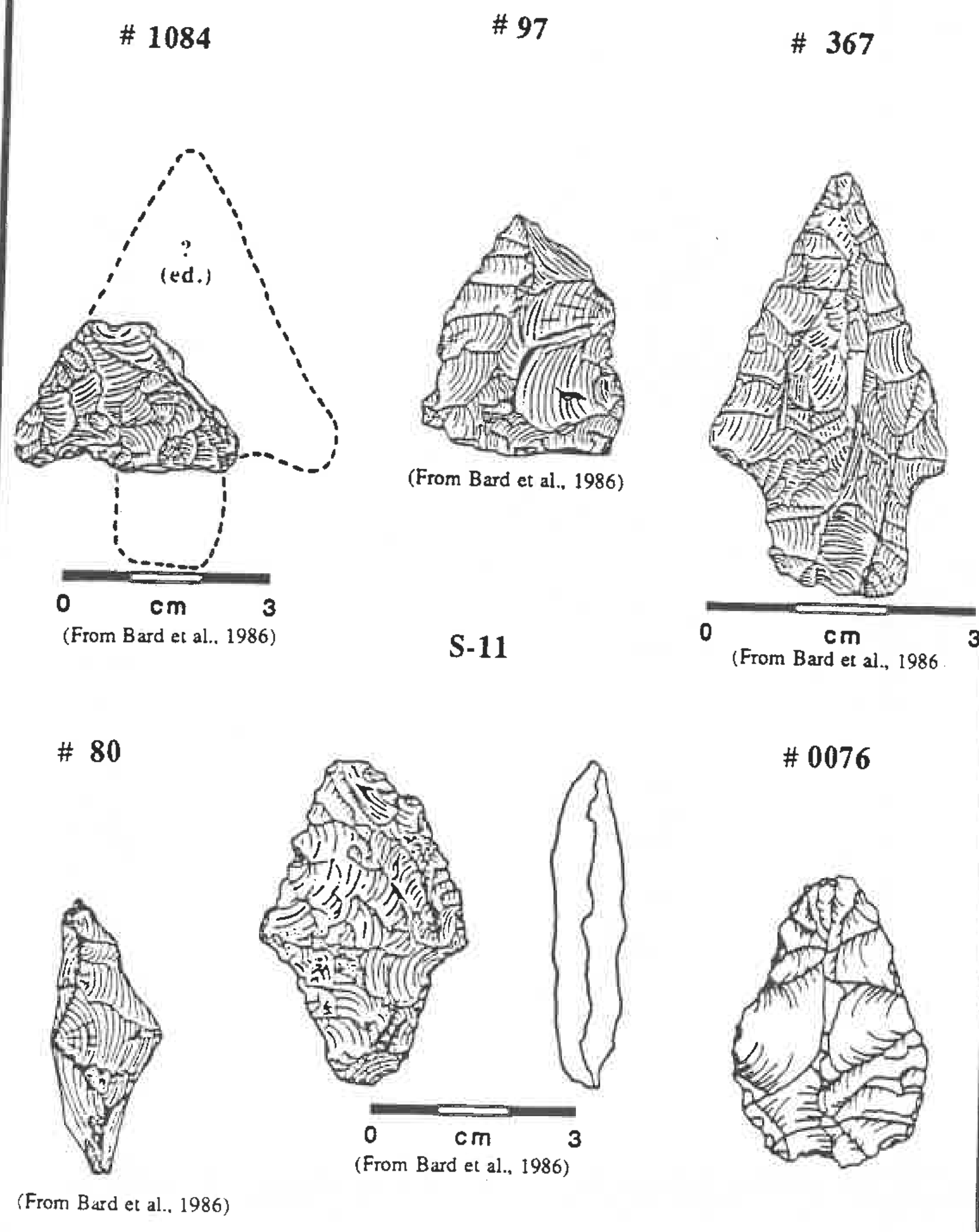
(From Fong et al., 1988)

6026



Dorsal View Ventral View

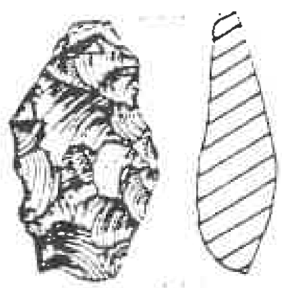
Bifaces and Biface fragments from CA-SCI-68



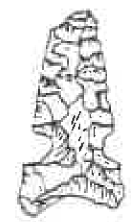
Bifaces and Biface fragments from CA-SCI-137

Scale 1:1

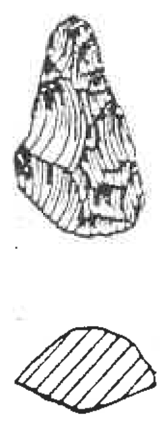
153



#208



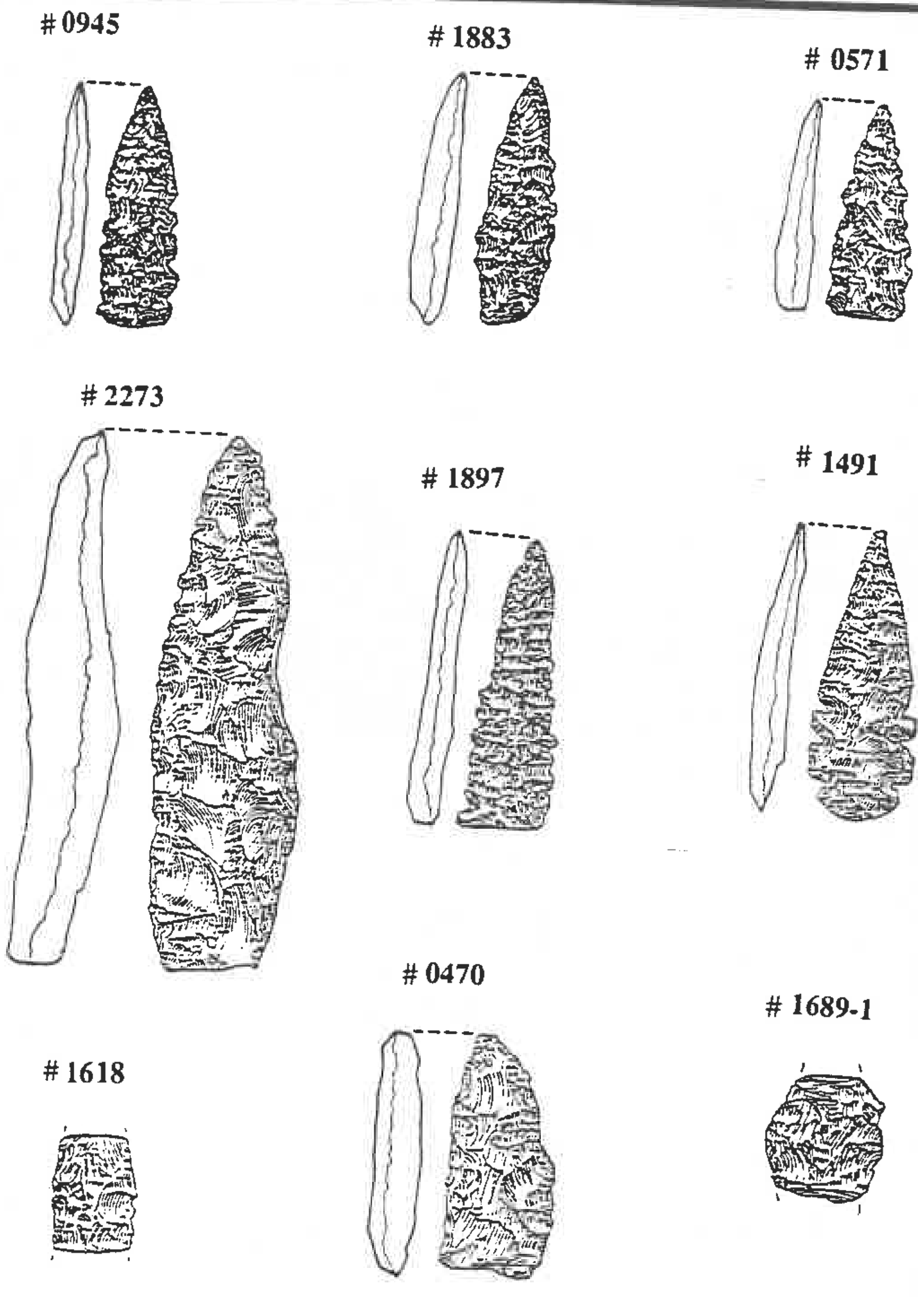
170



231

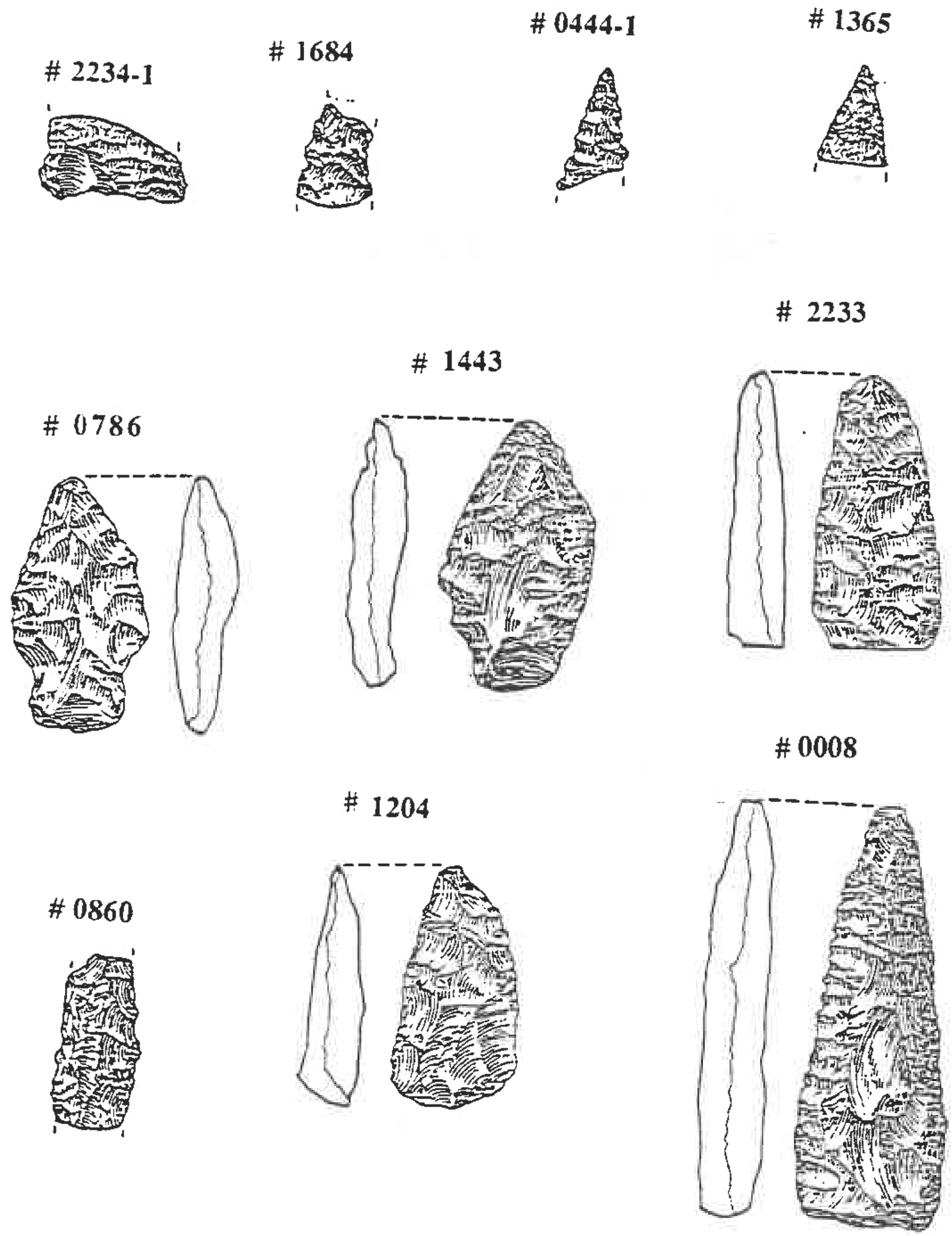
(From Cartier. 1980)

Bifaces and Biface fragments from CA-SCI-300/302



(all artifacts are from Hylkema et al., n.d.)

Scale 1:1 Bifaces and Biface fragments from CA-SCI-690



(all artifacts are from Hylkema et al., n.d.)

Scale 1:1 Bifaces and Biface Fragments from CA-SCI-690

Several of the point types described above appear to have some chronological significance based on archaeological studies conducted in other areas. A seriation of the biface sample might shed further light on this subject, but unfortunately, there are many factors which make this a problematic procedure. One must not rule out the possibility of differential deposition of biface types in burial and midden contexts. The recovered sample of bifaces may also be influenced by the type of contexts that were focused upon in recovery projects. Finally, one must consider that for a group of sites with deposits consisting primarily of Middle Period components, morphological differences in bifaces may not reflect chronological phenomena.

In a temporally restricted assemblage, it is quite likely that stylistic factors account for much of the observed variability, but it should be clear that it is much easier to order an assemblage differentiated on technological grounds. As an example, one might note that a Stockton Serrated point was found only at SCl-690, the site with the latest dated occupation; and that this type of point is generally associated with a technological change, i. e. the introduction of bow and arrow technology. Chronological ordering on the basis of stylistic variability, on the other hand, is more difficult to observe, requires a much larger and more complete sample size, and is less likely to reflect unique chronological phenomena. Thus, although a seriation based largely on stylistic changes has been developed (see Chronology section) for the very large *Olivella* bead sample from the Guadalupe Corridor, a seriation of the biface assemblage is unlikely to produce plausible results given the nature of the sample, which is likely to contain a significant stylistic component. Despite these difficulties, it was still possible to develop a basic classification; and refinement of this scheme, based on further research in the Santa Clara Valley, may yet produce chronologically significant results.

RAW MATERIAL AND DEBITAGE ANALYSIS

The primary raw materials used in stone tool manufacture in the Guadalupe Corridor are Franciscan chert, Monterey-banded chert, and some obsidian, along with limited use of quartzite, chalcedony, basalt, jasper, and sandstone. The vast majority of the projectile points found in the Corridor sites are manufactured from obsidian. Although obsidian was not available locally, its superior qualities made it a highly prized material, as subsequent analysis will show. Franciscan chert has the next strongest internal structure--much stronger in comparison to Monterey-banded chert, which has internal laminations. Besides being a better quality material than Monterey-banded chert, Franciscan chert was a local material that could be found at such places as the foothills of the San Francisco Bay area, including the Santa Teresa Hills, and the bed of the Guadalupe River (Fenenga, in Cartier 1987).

One of the methods by which a rough estimate of the amount of knapping done in a locality can be gauged is to note the amount and frequency of lithic raw materials in debitage collected from a site. Given the high frequency of obsidian in the biface sample discussed above, one might expect that the frequency of obsidian debitage would also be high. However, when this information is compiled the following results appear:

Raw Material Distribution, by Count

Site	Bifaces			Debitage		
	Obsidian	Franciscan	Monterey	Cherts	Obsidian	Other
68	0.7778	0	0.2222	0.9229	0.0186	0.0585
137	0.4	0.4	0.2	0.8291	0.0178	0.153
300/302	0.6	0.4	0	0.9318	0.0492	0.0189
6	0.9167	0.0833	0	0.8948	0.0716	0.0336
690	0.7419	0.2851	0	0.9925	0.0064	0.0012

When one compares the raw material frequencies among bifaces and debitage assemblages it becomes clear that, although the dominant biface raw material was obsidian (72% by count), very little obsidian working (average 3% of the debitage by count) was being carried out at the Guadalupe Corridor sites. In fact, cherts dominate the debitage sample. Certainly this distribution can be partly explained by noting that many types of less formalized tools were made of local materials, and the focus on burial recovery has undoubtedly affected the biface sample under consideration. But this does not change the fact that obsidian bifaces do dominate in burial contexts, despite their being little evidence for substantial obsidian working in the associated middens. Hylkema (1991: 78) notes that along the Santa Cruz Coast, obsidian pieces are almost always fragments or complete specimens of formal tools and that recovered debitage reflects nothing more than formal tool edge maintenance. From this, he infers that formal tools themselves were imported into this region. The rarity of obsidian debitage from the Guadalupe Corridor sites is seen to be the result of a similar process, where only blanks or roughly finished formal tools were being imported, as opposed to cores or nodules, which require significantly more working than do blanks. The importation of shipping blanks or preforms of obsidian is also considered a pan-Californian phenomenon by Chartkoff and Chartkoff (1984: 213).

There is further patterning in the raw material data that deserves attention, especially with regard to obsidian. When one breaks down the biface classification into two groups consisting of all lanceolate forms and non-lanceolate forms, one notices that a statistically significant correlation exists between obsidian and lanceolate biface forms.

Comparison of Biface Form and Raw Material

	Obsidian	Cherts	Total
Lanceolates	20	3	23
Non-Lanceolates	3	6	9
Total	23	9	32

The Chi-squared value of this 2x2 contingency table = 9.20, which is significant for one degree of freedom at the 99% confidence level in rejecting the null hypothesis--that the distribution of obsidian and chert over the two biface categories is the same. The test is not definitive, however, as the sample size of chert bifaces is extremely small (Shennan 1990: 71).

This evidence suggests that when the inhabitants of the Guadalupe Corridor got hold of obsidian shipping blanks, they were not modified to make just any type of biface, but most often stayed or ended up in the form of lanceolate shaped bifaces. Obviously this pattern-

ing is partly the result of the form in which obsidian appears to have been imported; but still, the association of obsidian lanceolate bifaces and burials, and the rarity of obsidian in non-lanceolate bifaces, other tool types, and debitage appears to have resulted from more than simple exchange factors, and begs further explanation.

To understand the role of obsidian in the prehistoric societies of the Santa Clara Valley, it is important to first remember that obsidian, despite being unavailable locally, was the highest quality lithic raw material for the production of sharp cutting or piercing tools. Although obsidian was obtainable locally through trade, it had to be transported a considerable distance before it reached the Santa Clara Valley. The obsidian source data, combined with the associations described above, argue that because of its superior qualities for stone tool manufacture, and its exotic nature, obsidian was considered to be a desirable, high status material by the prehistoric inhabitants of the Guadalupe Corridor. Thus, it is likely that stone tools made from this material, in addition to functioning better, were perceived prehistorically as objects with a role in particular social activities.

It should be apparent that certain types of raw material received greater attention than others prehistorically, and the same can be said for the forms of the tools made out of such materials. It has been argued recently that regularization of form in certain classes of stone tools, whose functions can often be inferred, should be viewed as a form of symbolic elaboration (Hodder 1990: 282). This perspective may provide information as to the activities accomplished with the aid of certain tools that occupied the minds and thoughts of those who made and used them. An extreme example of this symbolic elaboration is seen in the eccentric flints made by the Classic Period Maya--sacrificial flint knives in the form of certain Maya deities in profile (cf. Schele and Miller 1986). These artifacts in striking form attest to the symbolic importance of knives in the bloodletting rituals of the Classic Maya, and to the importance of flint, a high quality lithic raw material, as the material used in the manufacture of bloodletting tools.

It is clear from the recovered stone tools from the Guadalupe Corridor that, as is the case in many lithic assemblages throughout the world, it is projectile points (dart, arrow, and spear points) that exhibit the most regularization and elaboration of form. Part of this elaboration is certainly due to the effects that hunting and fighting had on the minds of those who did such activities. It should be kept in mind that one does not see other tool forms like scrapers or drills exhibiting such regularity and elaboration of form in the Guadalupe Corridor sample, nor are they commonly made of obsidian. One can argue plausibly that one of the reasons for this is that the act of drilling or scraping was not imbued with as much symbolic force as was the act of killing. In the Guadalupe Corridor, many of the uses to which projectile points were put brought about the death of other human beings or large animals, both activities which were often traumatic and dangerous, and would have necessarily brought many of the great mysteries of life to the forefront of the wielder's consciousness.

This connection between projectile points and the life of the spirit is supported in the Santa Clara Valley through the common inclusion of lanceolate obsidian bifaces in burial contexts, and is furthered by Pastron and Walsh (1989), who reported the discovery of two large (N=11, 18) and distinct clusters of lanceolate obsidian bifaces within the cemetery at CA-SCl-131 (a roughly contemporaneous site) that were not associated with any particular burial. These were interpreted by Pastron and Walsh (1989) not as funerary offerings, but as *cemetery* offerings--offerings made to the concepts that the cemetery embodied rather than the memory of a particular person. The ritual deposition of these clusters marks the cemetery as of particular importance to a certain people; but more importantly for this study, the fact that lanceolate obsidian bifaces were used as symbolic markers is an indication of the profound symbolic power embodied in this type of tool.

In addition to material and form, in some cases stone tools can be differentiated symbolically by size as well. Cartier (1992b) has noted that the lanceolate shaped projectile points from the study area appear in some cases to be too large for use on atlatl darts. These points may have been hafted on short thrusting spears instead of atlatl darts, as is documented for other Californian groups (McCorkle 1978), but even if they were atlatl dart heads, a partial explanation for their size can be derived, despite the compromise in their functional capabilities. It is argued that the social value of such forms may have been such that the value of larger, more visible lanceolate forms outweighed the corresponding loss of functional capability. This type of elaboration is well known in other parts of the world. For example, many of the polished stone axes from Neolithic Britain, in addition to being made of rare and exotic raw materials, are so huge that their functional capabilities are compromised. Clarke et al. (1985) argue that the primary reason for the incredible exaggeration in the size of these tools is that their value as symbols of power and prestige, and their role in ritual activity, was so great that it outweighed functional considerations.

In California, the ethnographic picture of aboriginal warfare is of a very ritualized and formalized affair, with the opposing sides lining up opposite of each other, dancing and chanting as much as fighting (Margolin 1978). If the ethnographic portrayal has any prehistoric precursors, it is likely that warfare during the Middle Period in the Santa Clara Valley involved a certain amount of display, and when this is noted, a possible rationale for the large size of lanceolate shaped projectile points emerges. The lanceolate shaped points may represent a more mild occurrence of the same type of phenomenon that is observed in British stone axes, where the value of obsidian points as symbols of power and prestige was so great that the visibility of such objects was an important aspect, in addition to physical function. SCl-6-1183, a very large lanceolate shaped projectile point, may be the extreme example of this phenomenon found in the study area. To be sure, these points were used in violent conflict, as is evidenced by the points found stuck into the bones of several of the recovered skeletons in the area; but nevertheless, when one considers the amount of display, posturing, and gesturing that also went on in Native Californian "battles," the importance of the visibility of the instrument of death can also be understood.

If the three types of symbolic elaboration discussed above--material, form, and size--are taken in conjunction, what immediately becomes apparent is that obsidian lanceolate projectile points were the most elaborated stone tool type utilized by the inhabitants of the Guadalupe Corridor. When one considers that only one of the projectile point wounds exhibited by skeletons recovered in the study area was not caused by an obsidian lanceolate projectile point, a plausible explanation for the maximal elaboration of these forms emerges: they were manufactured (or imported) as weapons for use in violent conflict. The prevailing popular view of the prehistory of the San Francisco Bay Area has considered intergroup conflict as sporadic and unusual; but the interpretation offered here, of an artifact type possessing social value and symbolic meaning based on its usefulness in violent conflict, may be cause for a reassessment of this view. The production of tools to be used specifically in the various dimensions--physical, violent, competitive, ritual, and spiritual--of Native Californian warfare may be an indication that such conflict was more widespread in the Middle and Early Late Period than has been previously thought.

This analysis also points to the social and symbolic role that material culture plays in living societies. The tendency in archaeological writing has been to treat the archaeological record as a passive reflection of cultural processes. In other words, the majority of the archaeological remains studied by archaeologists are often considered to have been deposited as a result of "mindless" behavior. Studies like this one, however, should be taken in support of the proposition that the archaeological record is in part meaningfully constituted (cf. Hodder 1991; Shanks and Tilley 1987). The distribution of obsidian projectile points and debitage in the Guadalupe Corridor sites is partly the result of thoughtful behavior--specifi-

cally, the social role that obsidian appears to have played in the societies that are being investigated. Thus, the results of this analysis should contribute to the understanding that material culture plays a much more active role in living societies, and hence cultural process, than has generally been assumed in studies of Native California.

BONE ARTIFACTS

Bone was an extremely useful material for the prehistoric inhabitants of the Santa Clara Valley. Unfortunately, bone does not preserve as well as stone in the archaeological record, probably causing the importance of bone implements to be underestimated in the reconstruction of past cultures. The bone artifacts found in the Guadalupe Corridor were certainly important components of the inhabitant's day-to-day life. The bone artifacts found in the Guadalupe Corridor fall into five main categories: awls, wedges, bird bone whistles, flakers, and other tools.

The bone artifacts recovered from the six major sites in the Guadalupe Corridor are presented in the following table. It should be remembered that different recovery programs which unearthed these artifacts used different classification schemes and few of these tools come from volumetrically controlled excavation units. The data are again presented here for generalized comparisons, followed by a short description of each type of artifact.

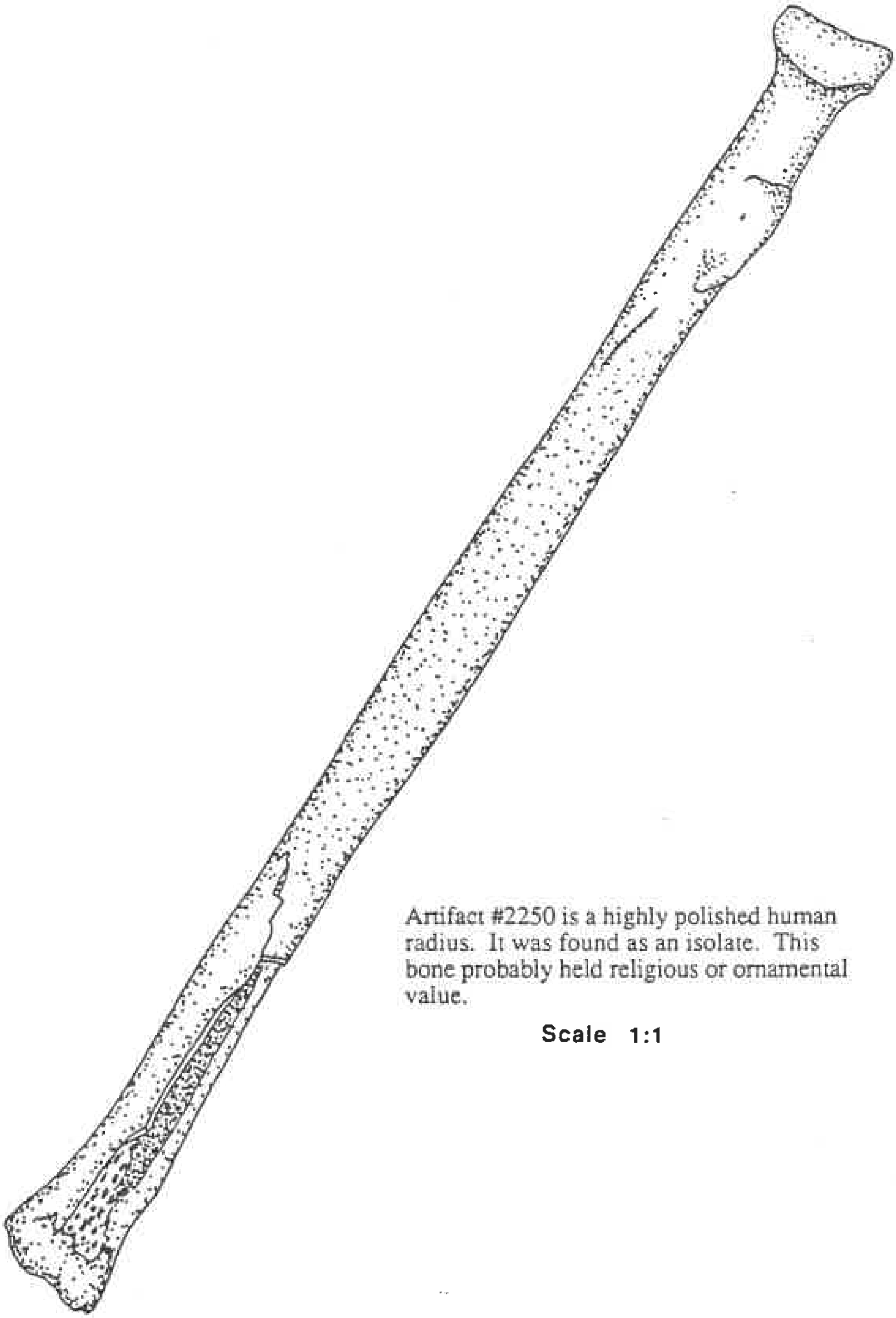
Bone Artifacts

Site	Awls	Wedges	Whistles	Flakers	Other Tools	Total
6	3	0	1	1	5	10
68	5	1	2	1	1	10
128	0	1	0	0	0	1
137	8	4	1	0	10	23
300/302	5	0	0	0	8	13
690	9	2	2	1	50	64

Awls are long narrow bones often used in weaving activities. Ethnological reports indicate that awls in this region were used in coil basketry, a highly developed craft among central California Native Americans (Heizer and Whipple 1951).

Bone wedges were useful tools for many splitting and prying activities. These artifacts have a thin edge tapering from a thick back. The thin edge can be driven into a narrow opening, often in a piece of wood, to allow the material to be split apart.

Flakers are basically antlers from game species, such as elk and deer, which were widely used as soft hammer percussion instruments in flint knapping. These useful bones were undoubtedly also used for many other utilitarian functions.

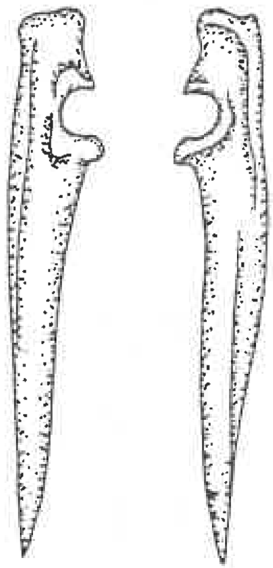


Artifact #2250 is a highly polished human radius. It was found as an isolate. This bone probably held religious or ornamental value.

Scale 1:1

Bone Artifact from SCl-137

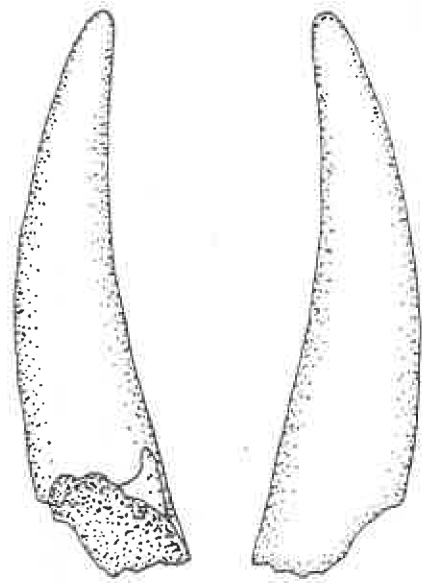
#6070



CA-SCl-68

0 4 cm.

#6021



Ventral View Dorsal View

CA-SCl-68

0 4 cm.

5087b

CA-SCl-68

0 5 cm

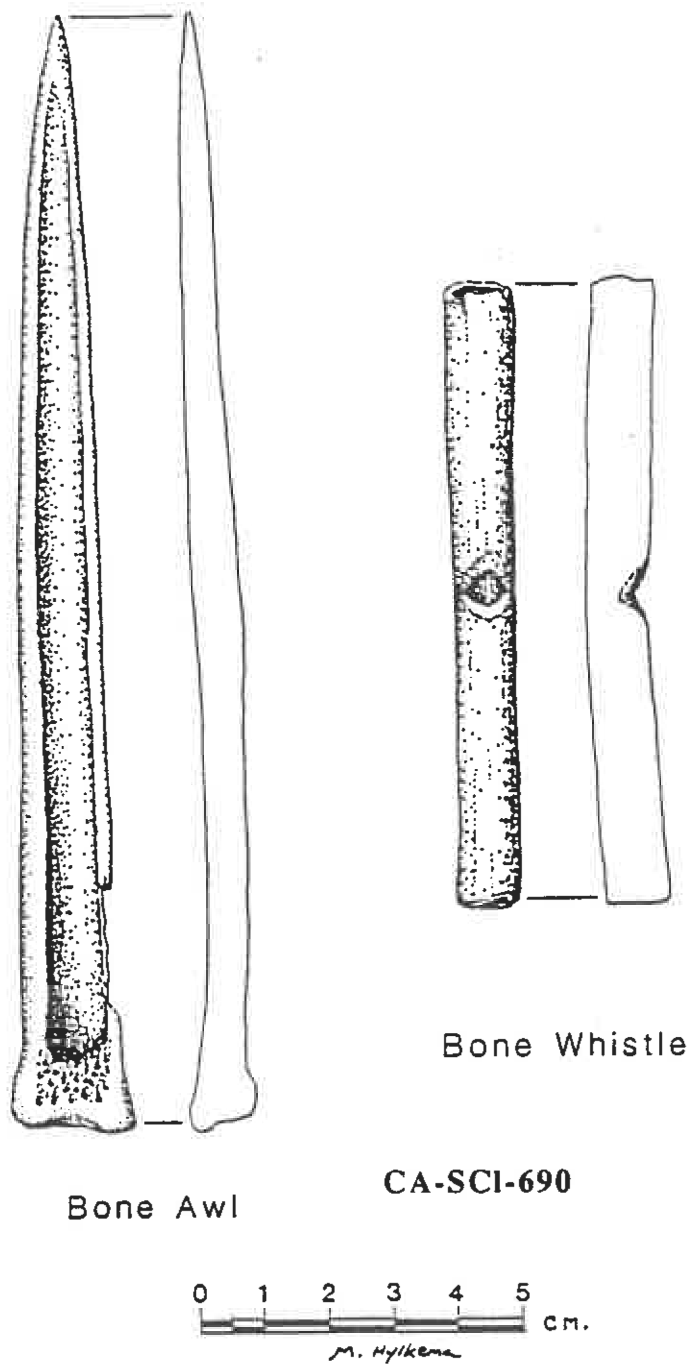
(From Fong et al., 1988)

#5417

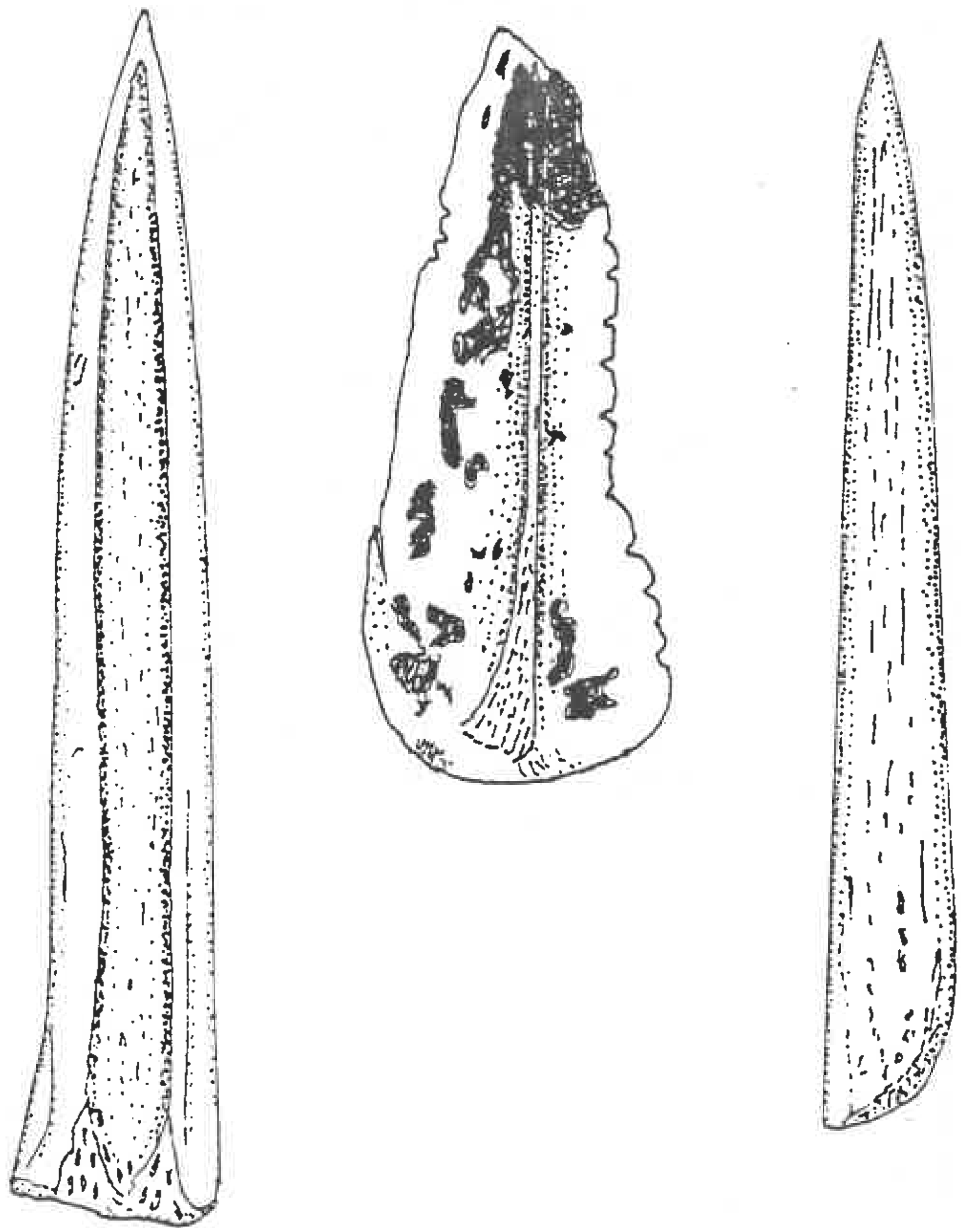
CA-SCl-68

0 4 cm.

Bone Tools from SCl-68


Bone Whistle
Bone Awl
CA-SCI-690
0 1 2 3 4 5
cm.
M. Hylkema

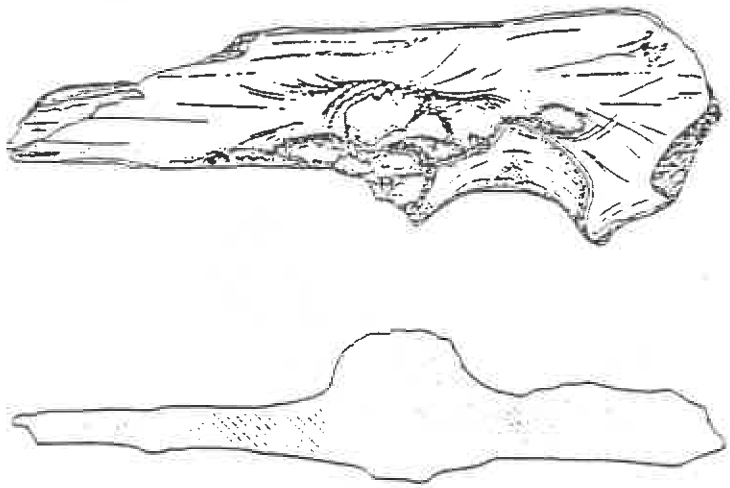
#1184 #1085 #1186



Scale 1:1

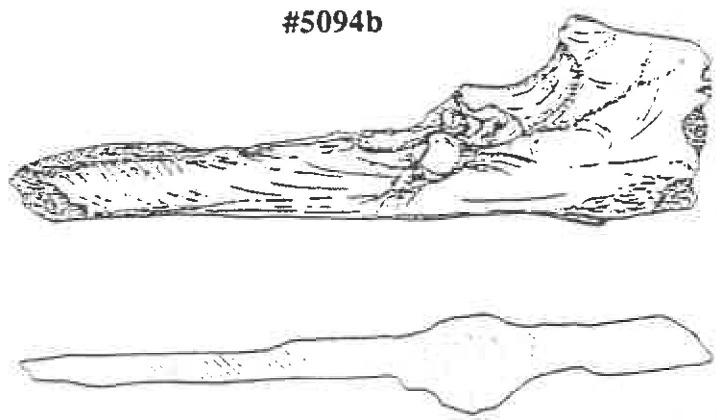
Bone Tools from SCI-6W (From Cartier, 1990)

#5094a



CA-SCI-68

#5094b

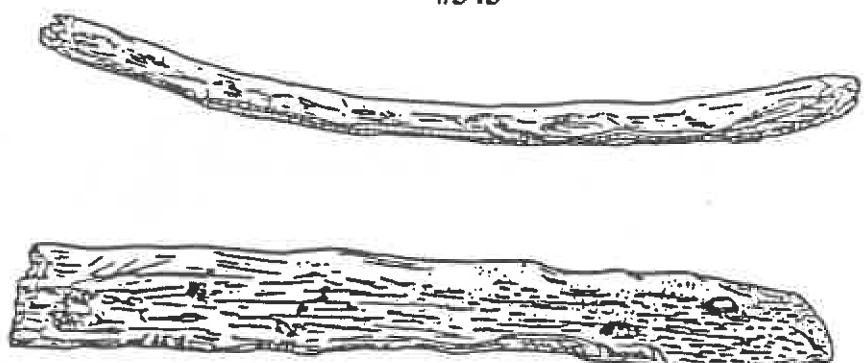


CA-SCI-68

(From Fong et al., 1988)

Bone Tools from SCI-68

#343



CA-SCl-137

0 cm 3
(From Bard et al., 1986)

#252

CA-SCl-137

0 4 cm.

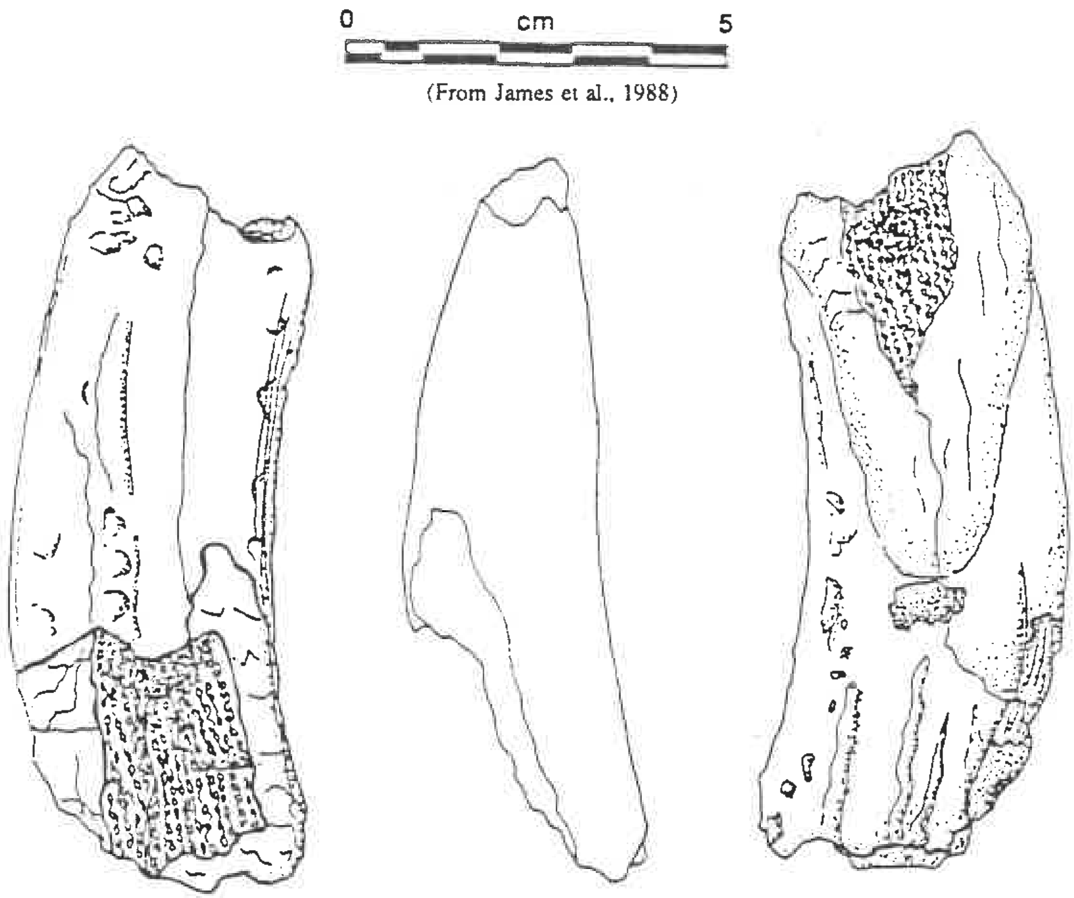
#127

CA-SCl-447

0 cm 3
(From Bard et al., 1985)

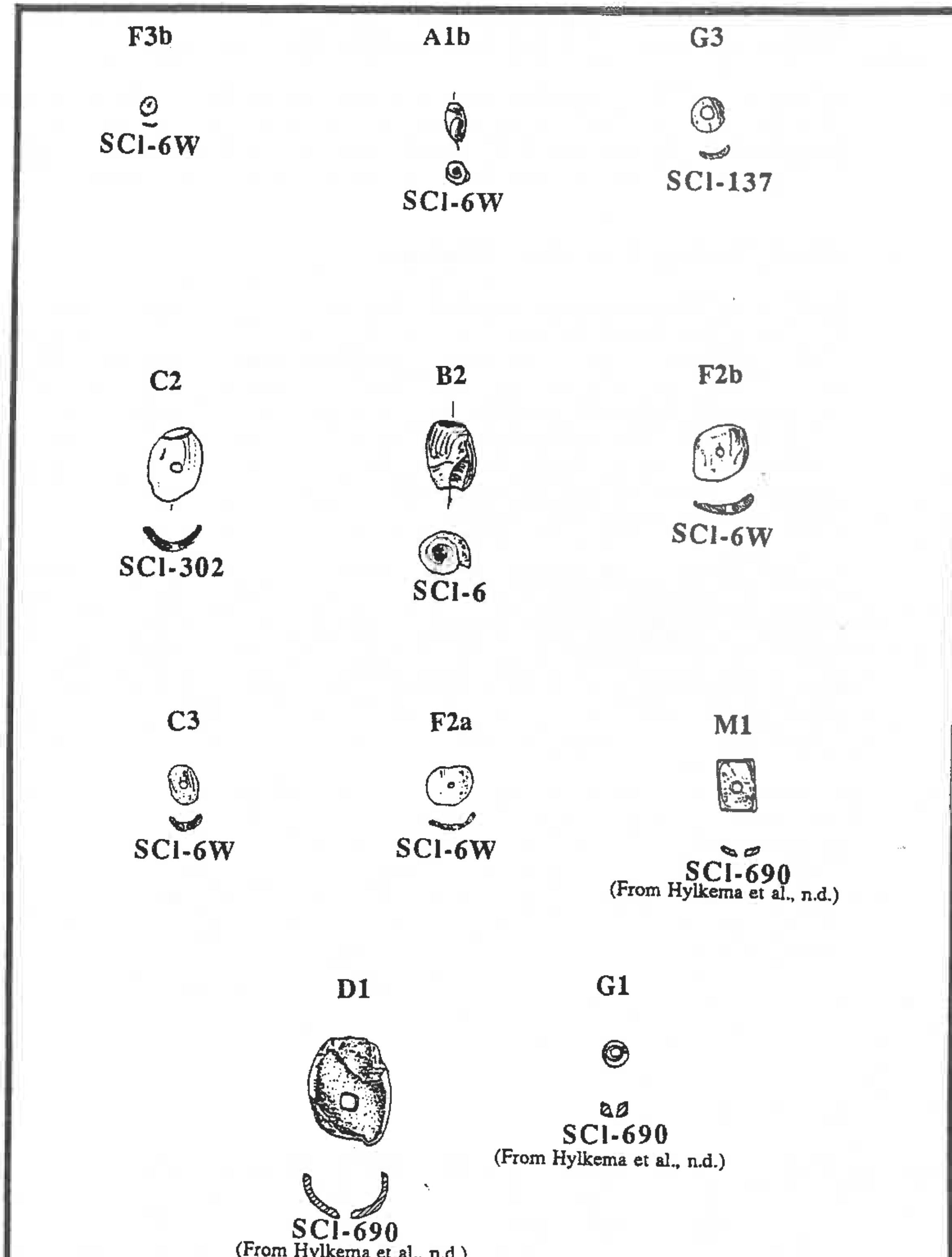
Bone Tools from the Guadalupe Corridor (continued)

#64



CA-SCl-128

Bone Tools from SCl-128



Olivella Beads from the Guadalupe Corridor (selected examples)

Whistles or flutes made of bird bone have been found in several sites in the Santa Clara Valley, including those of the Guadalupe Corridor. These artifacts were likely used in ceremonies and rituals, as well as for entertainment in everyday life.

Several bone artifacts have been uncovered in the region that functioned in ways which are somewhat unclear. These have generally been classified as ornamental or religious items, partly because ethnographic data indicates such uses for similar items, and partly because this category serves as the catch-all for artifacts with unknown functions (Gifford 1947).

SHELL BEADS AND ORNAMENTS

Shell beads and ornaments are some of the most heavily researched elements of Native Californian material culture. For example, Chagnon (1970) has illuminated the role of shell money in Native Californian economies; and Bennyhoff and Hughes (1987) have shown that shell beads and ornaments were important elements of a prehistoric exchange system that operated throughout California, the Western Great Basin, and the Southwest. In addition, King (1990) has argued that these artifacts, in their varied styles and traditions, are indicators of social and economic subsystems. Clearly, shell beads and ornaments can provide a wealth of information about Native Californian societies, and therefore a full reporting of these artifacts is necessary.

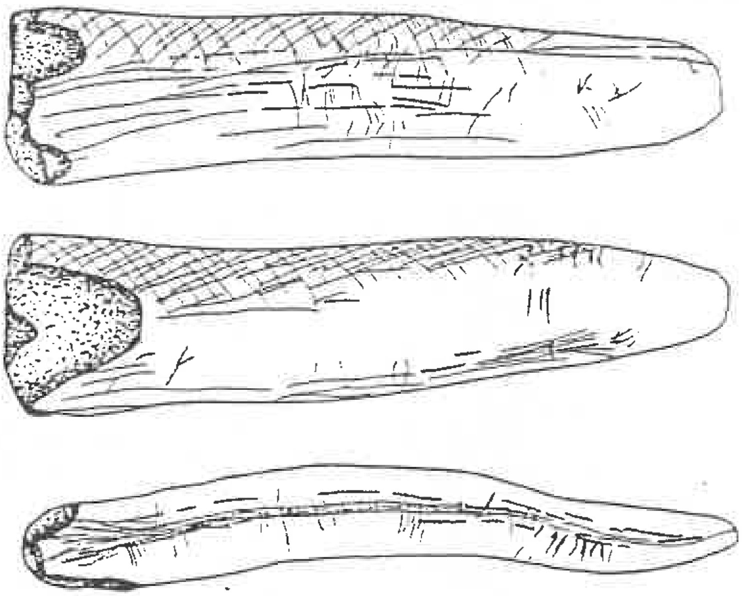
A primary focus of *Olivella* bead analysis is the development of chronologies. These artifacts have long been recognized as sensitive temporal indicators. Several chronologies of *Olivella* bead types have been developed (Bennyhoff and Hughes 1987; Bennyhoff and Fredrickson 1967; Gifford 1947) which greatly facilitate the seriation of archaeological deposits from *Olivella* bead samples. Through the comparison of diagnostic artifacts within a cultural region, it is possible to date one site in relation to another. See the chronology section earlier in this report for more discussion of this technique with *Olivella* beads.

A second focus of bead and pendant analysis is the study of their display. Using field notes, drawings, and photography, the locations and placement of beads and pendants are recorded and then analyzed for possible reconstruction of the artifact or feature originally associated with the shell ornament. The study of bead and pendant displays is critically important, for the display may be a key indicator of the use and artistic presentation of the artifacts. Examples of shell ornament display can be found at CA-SCl-302. Both an *Olivella* bead display, as well as an *Haliotis* display were found among the burials from this site. Burial 2 contained a large amount of Class F *Olivella* beads in the area of the head. It is believed that a basket, hat, or other object with the *Olivella* beads attached to it was placed on the head of this individual at the time of interment.

Olivella Beads

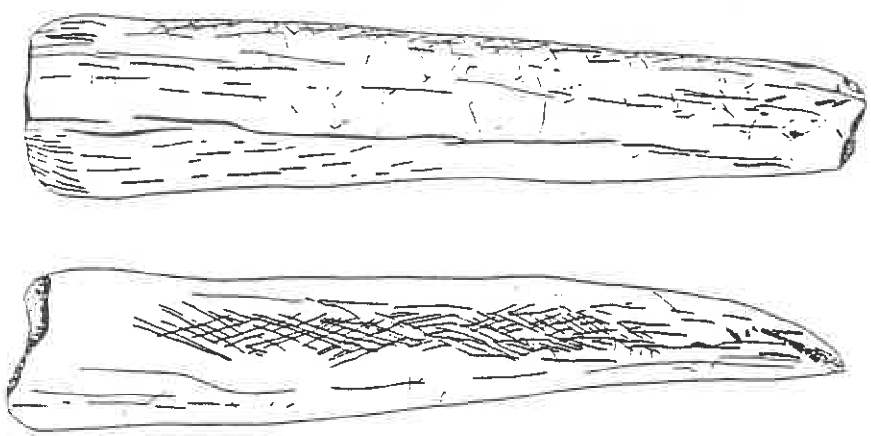
The study of *Olivella* beads in the Guadalupe Corridor helps to identify the site chronology as well as the relative wealth of the sites. Cut *Olivella* beads from Corridor sites are generally described as being saddle, saucer, rectangular, circular, or square in shape. These beads are cut from the *Olivella* shell, ground to the desired shape, and drilled or punched to form the perforation. The temporal range of the *Olivella* beads found within the Guadalupe Corridor is from the Early or Intermediate Phase of the Middle Period through Phase I of the Late Period (2900-600 years ago). The shells were collected along the Pacific coast,

#0081



CA-SCI-137

#0257



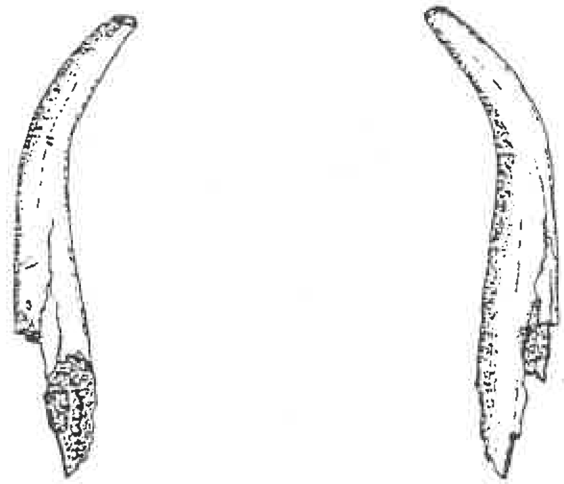
CA-SCI-137

0 4 cm.

(From Cartier, 1990)

Bone Tools from SCI-137

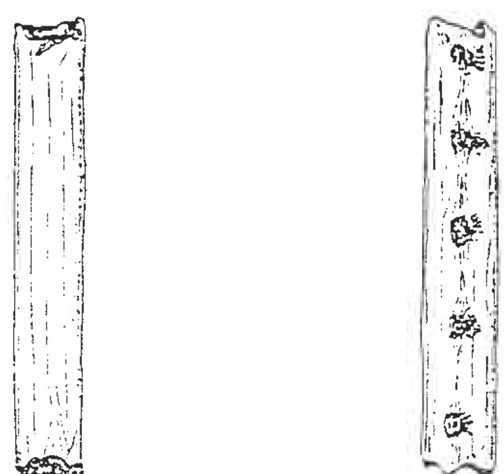
#5087a



CA-SCl-68

(From Fong et al., 1988)

#5094c



CA-SCl-68

(From Fong et al., 1988)

Bone Tools from SCl-68

cut, ground, and drilled in shapes that accord with the bead styles of the time, and then traded inland for other goods. (There may also have been some bead manufacturing inland using whole shells traded from the coast.) In the classification of the *Olivella* beads, capital letters identify classes, and the Arabic numbers that follow are used to distinguish individual types based upon their morphological similarities. Lower case letters following the numbers further classify the beads into subtypes. Below is a brief description of the different classes of beads found in the Guadalupe Corridor and a discussion of their significance according to the types and subtypes (Descriptions after Bennyhoff and Hughes 1987).

Class A
These are spiral-lopped beads that were constructed from the body whorl of an *Olivella* shell. Type A2 beads are dated to the early Middle Period in most cases, but were also manufactured during the Early Period in other parts of Central California.

Class B
These are circular beads with spirals grounded down at their aperture ends. The B2 type, found in CA-SCl-6, was manufactured during Phase I of the Late Period.

Class C
These are Middle Period and Transitional Phase *Olivella* beads constructed from half of a shell. The beads have a full shelf on their interior and their exterior edges are ground down. Type C2 beads were products of the Early Phase of the Middle Period and were found at CA-SCl-302. Types C3 and C7 are Middle/Late Period Transitional Phase beads which were located at SCl-6W and SCl-690 respectively.

Class D
These are beads constructed using half or one fourth of an *Olivella* shell and contain a central punched perforation. Type D1 beads were predominantly made during the Middle/Late Period Transitional Phase and were excavated at CA-SCl-690.

Class F
These are oval beads cut from the wall of the *Olivella* shell. F2a and F2b are both markers for the Middle Period and were each found at SCl-6W and SCl-302. Other subtypes that mark the Middle Period are F3a, found at SCl-6W, -128, -137, -302, -690, and F3b which was found at both SCl-6W and SCl-302.

Class G
These are circular beads with a central drilled perforation constructed from the body whorl of a *Olivella* shell. Type G3 beads are markers for the Early Phase of the Middle Period and were found at SCl-137 and SCl-302. Type G5 beads are markers for the Middle Period and were found at SCl-6W and SCl-137. The small G1 Type beads were found in large numbers at SCl-690.

Class M
These are rectangular, square, or trapezoidal beads with a small drilled perforation located at either the center or end of the bead. They were made from the wall of the *Olivella* shell. Type M1 beads were dominant during Phase I of the Late Period and are very important in the chronological placement of SCl-6W and SCl-690.

Looking at the specific types and total number of beads will help to identify the age and relative economic statuses of the sites. The three sites with the largest total number of beads in the Guadalupe Corridor are CA-SCl-690 with 32,902 beads, CA-SCl-6W with 2,471 beads, and CA-SCl-302 with 2,219 beads. Out of all the*Olivella* beads found, the

most abundant kind in the Corridor is subtype A1b which, unfortunately, has no temporal significance. Type M1 beads, which were predominantly manufactured during Phase I of the Late Period, were found in large numbers at SCl-690 and SCl-6W, with totals of 5,663 and 714 beads respectively. There was also one M1 bead found at both SCl-6E and SCl-128. C7 type beads, markers for the Middle/Late Period Transition, are only found in SCl-690 where there is a total of 258 beads. Markers for the Middle Period, F2a, F2b, and F3a Type beads, were all found at SCl-6W and SCl-137 with numbers totaling to 256, and 26 respectively. F3a beads were also found at SCl-128, SCl-302, and SCl-690 with totals of 148, 189, and 632 respectively.

In Bennyhoff and Hughes (1987), it was noted that Central California and Southern California sites show some variation in the temporal range of certain bead types. A similar pattern was found in the Guadalupe Corridor, which appears to follow the Southern California bead chronology more closely than that of the Sacramento Delta region (The latter is generally used for Central California bead chronologies). The chart below illustrates this point, in that all of the bead types listed are attributed to the Early Period in Central California, and the Early Phase of the Middle Period in Southern California. None of the Guadalupe Corridor sites date to the Early Period.

Corridor *Olivella* Beads with Southern California Temporal Range*

Bead Type	SCl-6W	SCl-68	SCl-137
A2a	457	13	0
A2b	120	32	0
A2c	36	1	1
L2b**	15	0	2

* All beads listed above are attributed to the Early Period in Central California and the Early Phase of the Middle Period in Southern California

** It is possible that the L class beads from SCl-6 are extreme forms of Class M beads, and perhaps should not be used for seriation.

Haliotis Pendants

The *Haliotis* (abalone) is a large snail that has a cup-shaped spiral shell, in which the body whorl constitutes most of the shell. A row of oval holes is located along the left margin of the shell and the interior is highly iridescent. *Haliotis* pendants were generally manufactured by removing the lipped rim of the shell. This was accomplished by chipping or breaking along the alignment of the siphon holes and by snapping the rim section free at the whorl end of the shell. The resulting debitage was often used in manufacturing another type of pendant, or may have been used in the manufacture of shell tools. The pendants have been found with both punched and straight-sided conically drilled holes that were most often located below and to the side of the whorl portion of the shell. However, some pendants have holes located near the tip of the spire.

The pendants found associated with burials in the Guadalupe Corridor were generally displayed across the upper chest with the nacreous (shiny) side facing outward. However, in Winter's 1978 report on CA-SCl-128, Fenenga mentioned that because many of the pendants have the epidermis ground away, it would appear that when worn on a necklace, both sides were shiny and could be displayed.

Current classification systems for *Haliotis* pendants are short of being all inclusive. Many of the pendants found in the Corridor have been listed without classification in earlier reports due to this problem. For example, Fenenga (in Cartier, 1979: 300) noted that the *Haliotis cracherodii* pendants associated with Burial 4 were not classified by any system, but were mistakenly believed to be slightly damaged ME1a pendants by Lillard, Heizer, and Fenenga (1939). Coupled with the shortcomings of the classification systems is the fact that many of the pendants were highly fragmentary, making classification impossible. As with *Olivella* beads, *Haliotis* pendants seem to have been both indicative of the age of the site and the social status or relative wealth of the individual with whom they were buried. The pendants appear to have been trade items into the Santa Clara Valley from their source on the rocky shores of the Pacific Ocean. It also appears that an increasing number of pendants found in the San Francisco Bay region are comparable to Middle Period pendants recovered from the Sacramento-San Joaquin Delta region. Descriptions of the various types of pendants that were found in the Guadalupe Corridor are given below:

Haliotis Artifacts Found in the Guadalupe Corridor Sites
(after Gifford, 1947)

<u>Whole Shells Used as Containers</u>: Type A
These are often not ornamental artifacts, but rather shells used as vessels.

<u>Natural Shell Openings</u>: Type H
These pendants were manufactured utilizing the natural shell openings. Such pendants had a large array of shapes, from rings to roughly rectangular shapes.

<u>Perforated Disk or Oval</u>: Type K
This pendant often has the epidermis thoroughly ground off. Also, the central perforation is small in relation to the body of the shell.

<u>"Banjo" or "Bighead" Pendants</u>: Type N
These pendants are diagnostic of Phase I and early Phase II of the Late Period. They are noted as having lateral projections with a squared space separating them from the distal projections, which is followed by a non-round, oval proximal end. These ornaments are believed to be zoomorphic or anthropomorphic in nature. The absence of these artifacts from late Phase II of the Late Period suggests that cultural changes may have been taking place at this time.

<u>Trapezoidal *Haliotis* Ornaments</u>: Type Q
These pendants are generally trapezoidal, though the corners are often rounded, and the sides may be slightly curved. Unless the artifact is small, it generally contains the natural cupping of the shell. It has also been noted that Type Q pendants are often derived from reworked triangular-shaped pendants.

<u>Sausage to Rectangular Shaped Pendants:</u> Type Z
These pendants are oblong, usually having parallel sides. The ends are either rounded or straight. Sometimes the epidermis is completely removed by grinding.

<u>Ovals with One or More Straight Sides</u>: Type AA
These pendants have a length that is always less than double the breadth.

<u>Half-Disk or Half-Oval</u>: Type AB
These pendants appear to be more semi-circular or "halved" than type AA.

Teardrop Shaped Pendants: Type AF
These pendants are triangular in shape with the pointed end hanging down and the broad, rounded end with a single conical perforation. The epidermis of these pendants exhibit little or no grinding.

Perforated Fusiform: Type AG
Gifford (1947) describes these as being "more or less spindle-shaped, torpedo-shaped, (or) cigar-shaped," which were often pointed at each end. These pendants are usually concavo-convex because of the cupped-shape of the *Haliotis* shell.

As was mentioned earlier in the *Olivella* discussion, artifact displays are important in interpreting the possible uses of shell ornaments. At CA-SCl-302, Burial 6 was found to have an extensive pendant display of *Haliotis* type Q2aII ornaments which encircled the pelvic area from the waist to the upper thigh. It appears that the individual was interred wearing a skirt-like item of clothing, possibly made of leather and appliquéd with the *Haliotis* pendants. The *Haliotis* pendants were attached, with the nacreous (shiny) side facing out. It is important to note that comparable displays were found with burials at the Rossi and Saunders sites (CA-Mnt-386 and -391 respectively). This grave lot was dated to approximately 3500 years B.P. (dating by radiocarbon analysis). When compared to the grave lot from CA-SCl-302, dating to approximately 2500 to 2700 years old, this style of display appears to have been in existence for at least 800 to 1000 years in the San Francisco and Monterey Bay Areas. The osteological analysis of Burial 6, SCl-302 classified it as a male. The collection of *Haliotis* displays, thus, provides for possible interpretation of the styles of clothing worn in the prehistoric past.

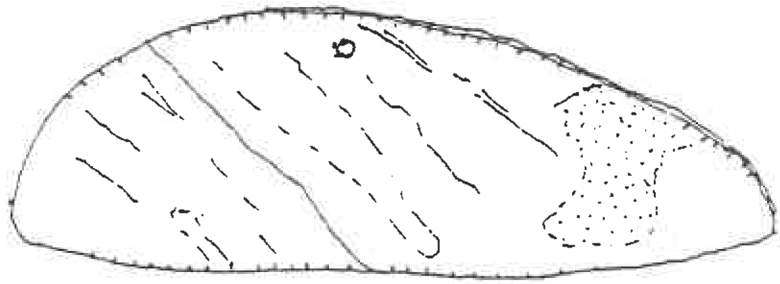
Bennyhoff and Hughes (1987) provided a limited concordance table which listed their *Haliotis* pendant typology with its approximate match in the system established by Gifford (1947). Such a table facilitates intersite comparisons between CA-SCl-690 and the other sites in the Guadalupe Corridor. Unfortunately, a table listing a complete concordance is not available, but all relevant information from the available concordance system is listed below.

Haliotis Ornament Concordance Table

Gifford	Bennyhoff
S2b II	uBA3a
S2a II	uBA3j
S2a III	uBB3j
K2b II	rCA3a
U2a II	uEB3j
Q6a III	uPA5j

The following chart lists the number of pendants reported at each of the sites located in the Corridor. These pendants were classified, when possible, using the system established by Gifford (1947). However, site CA-SCl-690 does deviate from this, utilizing the classification system established by Bennyhoff and Hughes (1987). Because a complete concordance chart does not exist for these two systems, site CA-SCl-690's pendant types are listed separately with Bennyhoff and Hughes's designations.

#1130

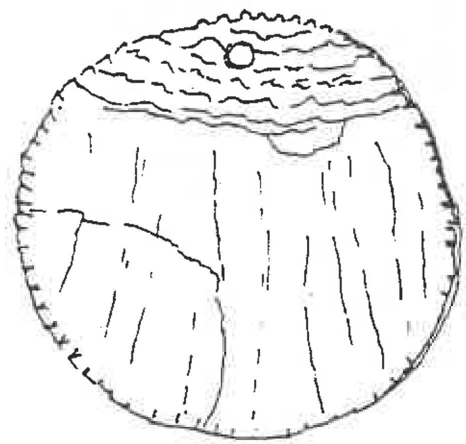


AB3a

#905A

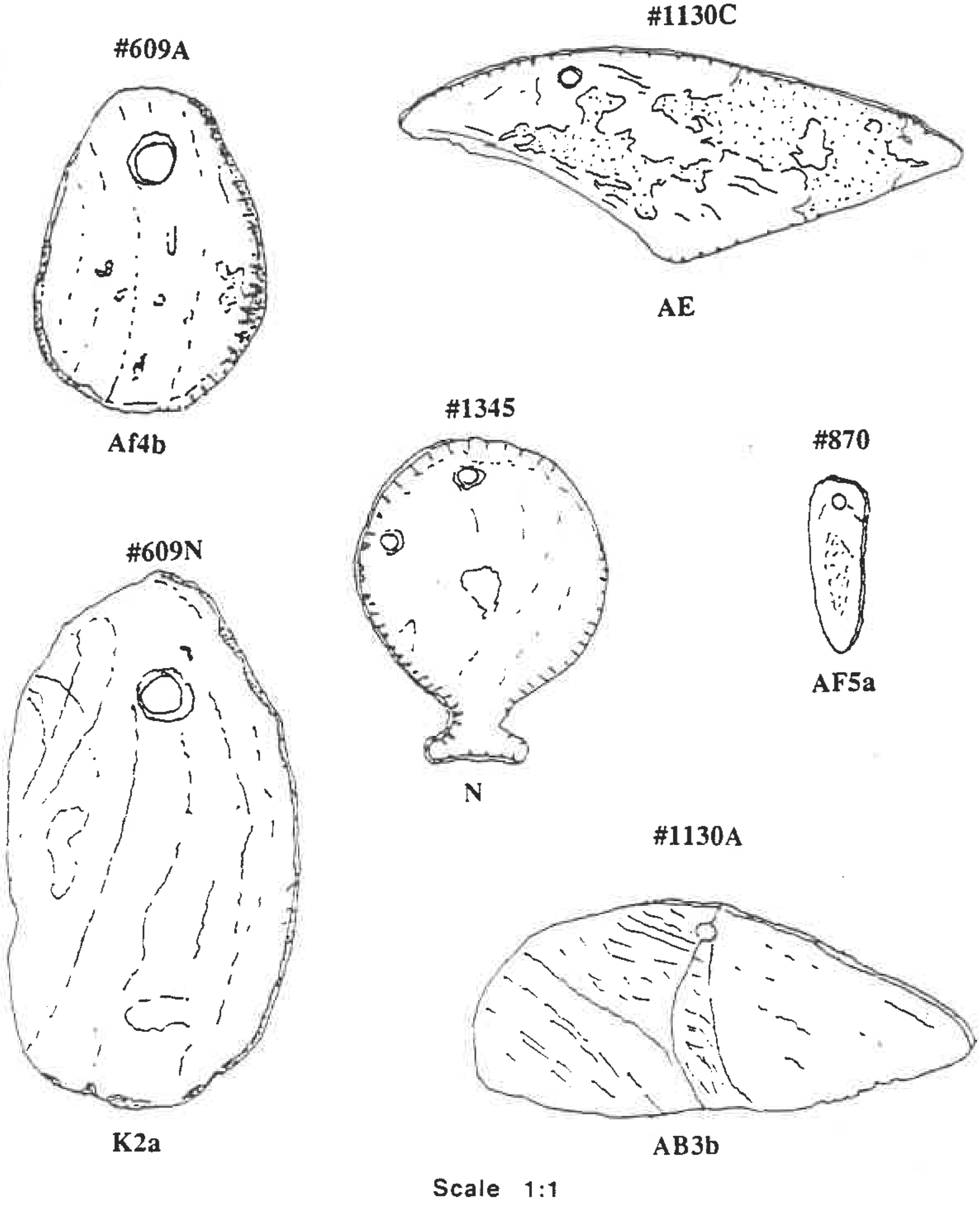
AS1a

#1344

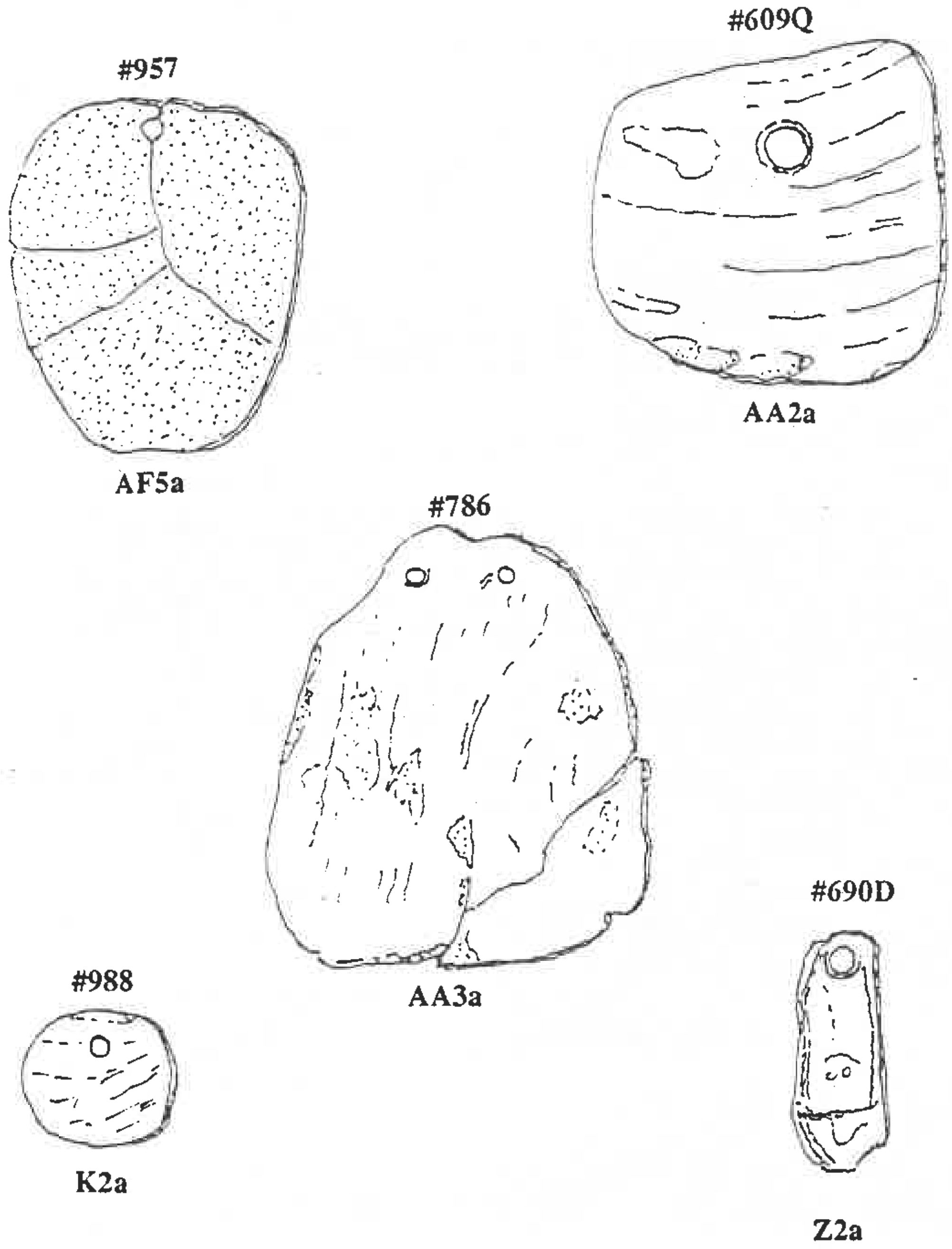


K2b

Haliotis Pendants from CA-SCI-6W (From Cartier, 1990)



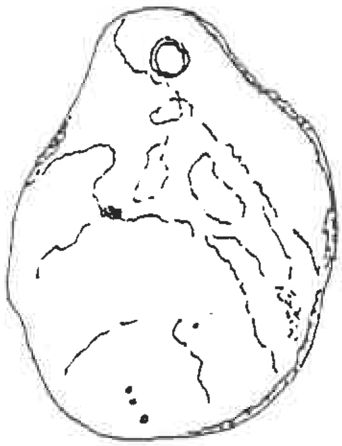
Haliotis Pendants from CA-SCI-6W (From Cartier, 1990)



Scale 1:1

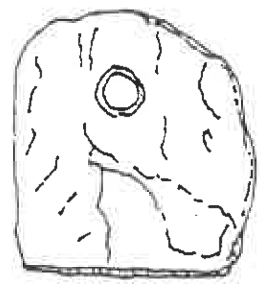
Haliotis Pendants from CA-SCI-6W (From Cartier, 1990)

#609O



AF4a

#609H

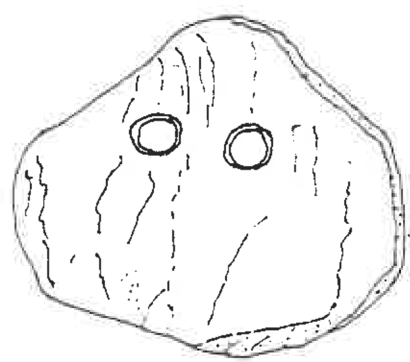


AB1a

#1343

K2b

#1031

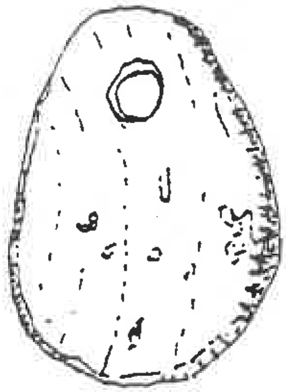


O2a

Scale 1:1

Haliotis Pendants from CA-SCI-6W (From Cartier, 1990)

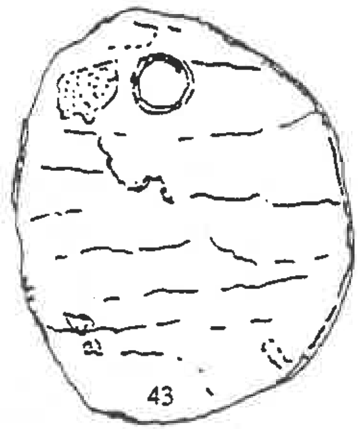
#609A



AF4b

SCI-6W

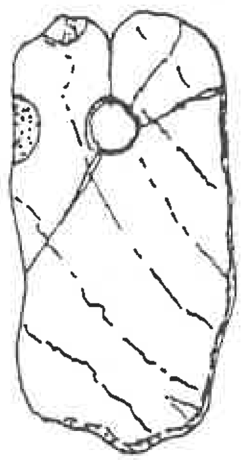
#609F



K2a

SCI-6W

#609B

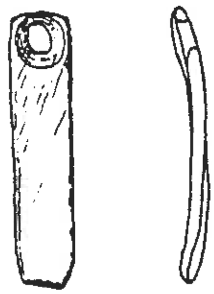


AA2a

SCI-6W

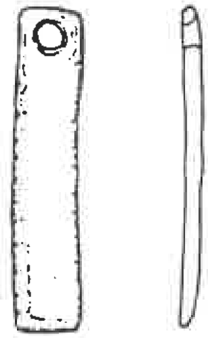
Scale 1:1

Haliotis Pendants from CA-SCI-6W (From Cartier, 1990)



Q1a1V

(From Fong et al., 1989)



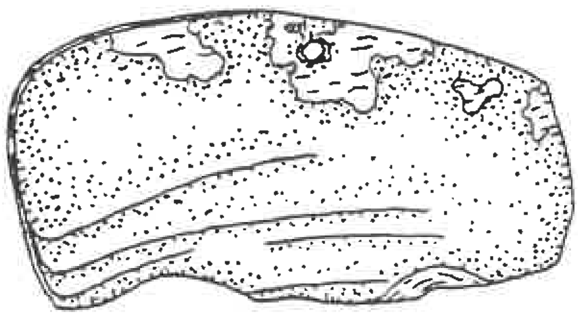
Q1b1V

(From Fong et al., 1989)

0 2.5 cm

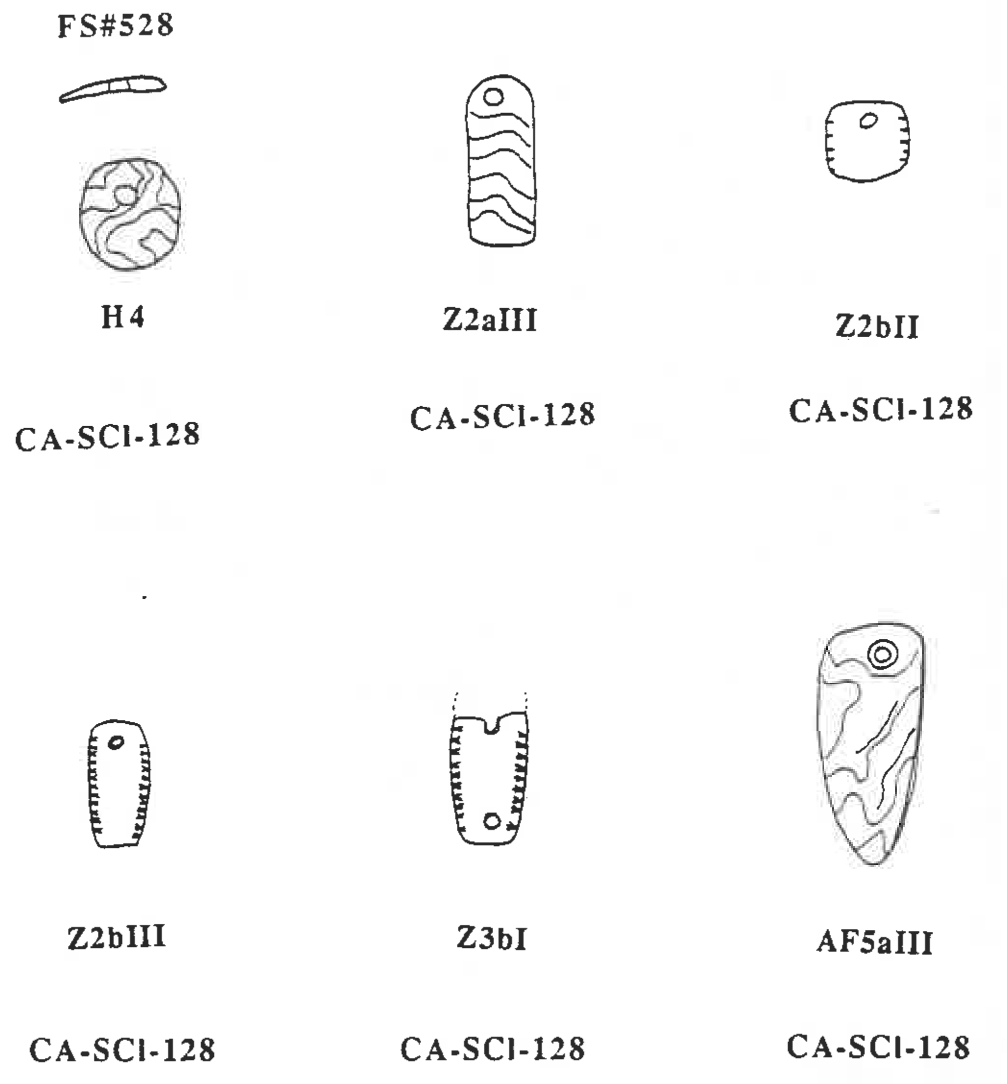
SCl-68

#5389



Q25a

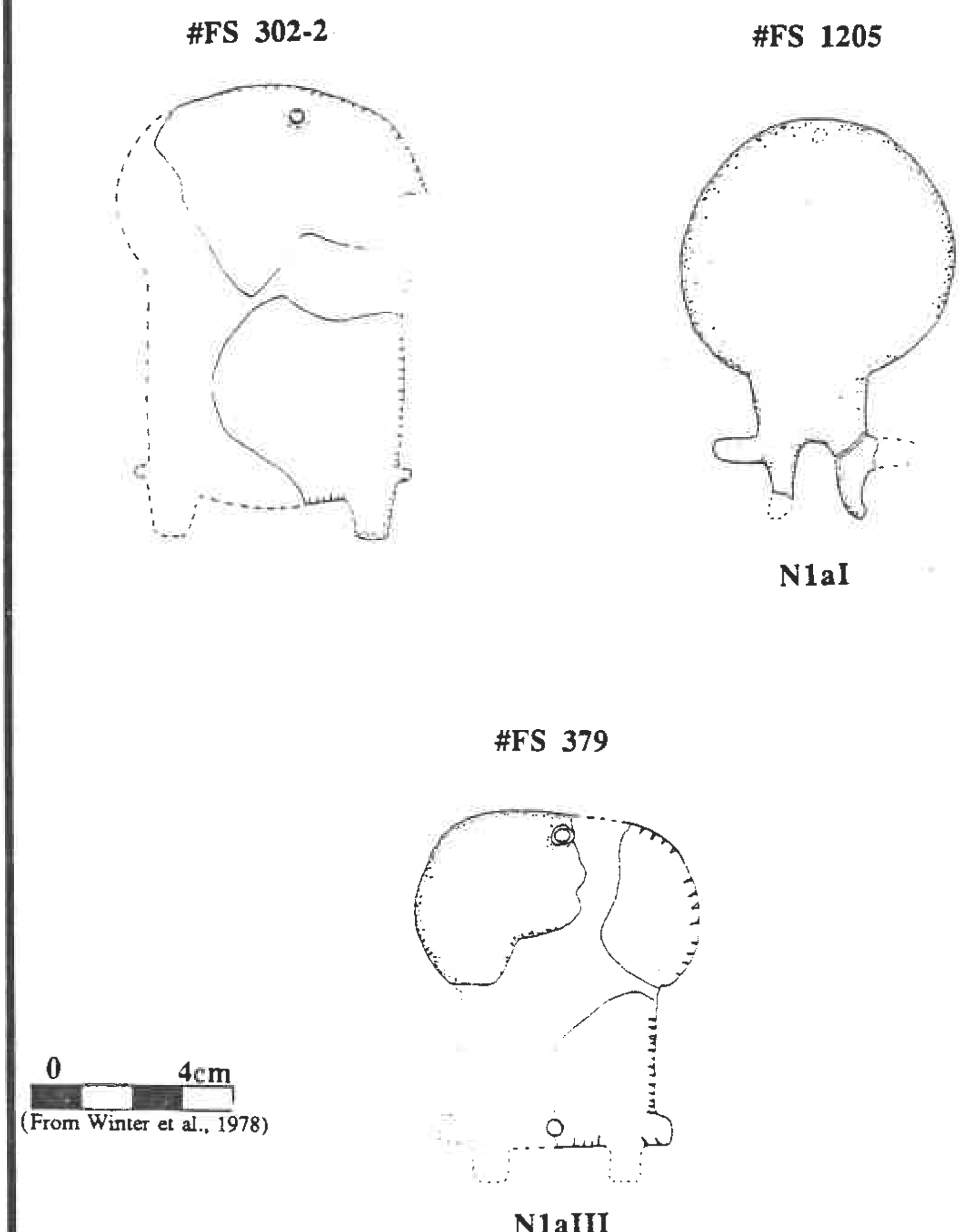
Haliotis Pendants from CA-SCl-68 (From Cartier, 1990)



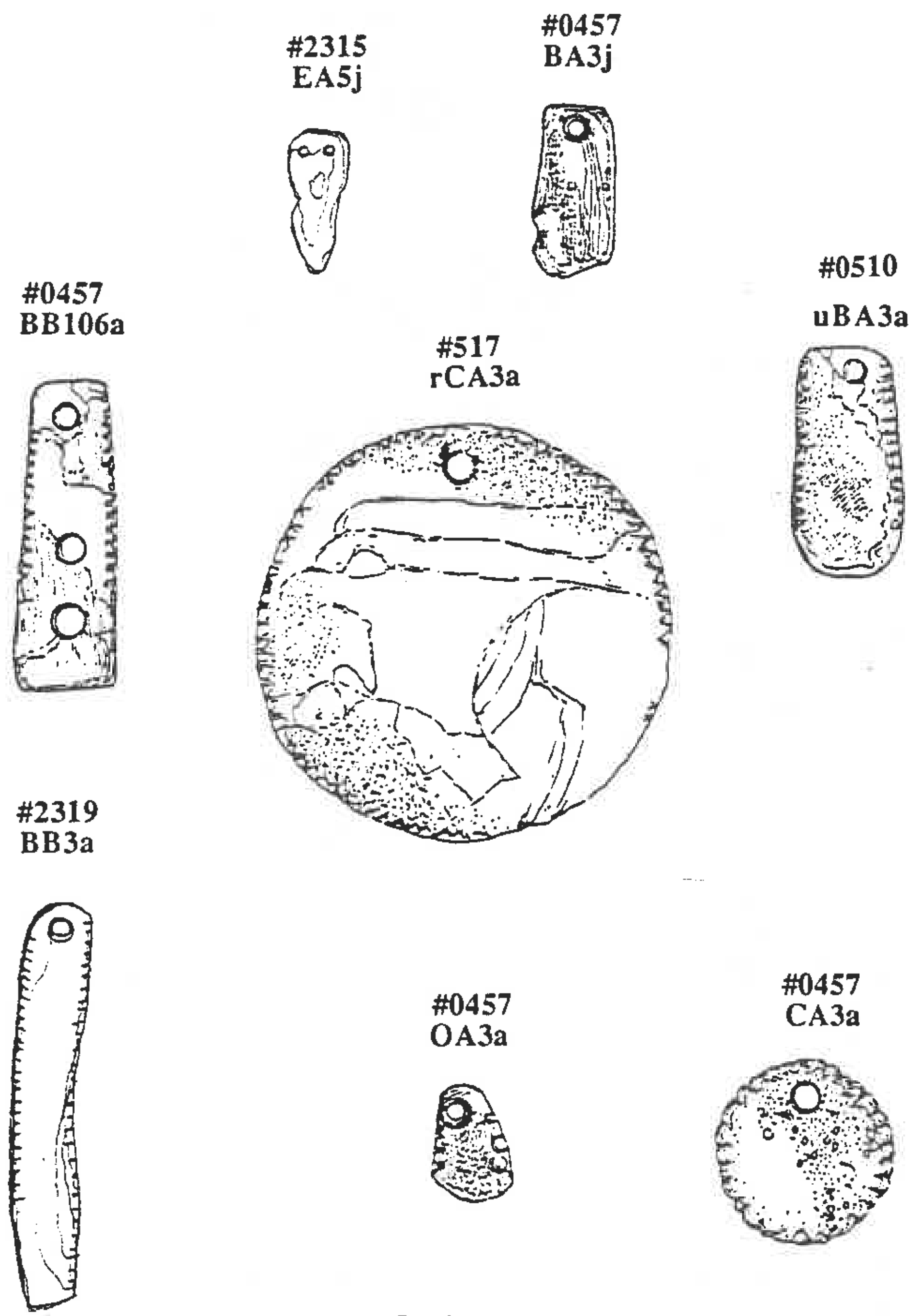
Scale 1:1

(From Winter et al., 1978)

Haliotis Pendants from CA-SCI-128



Haliotis Pendants from CA-SCl-128

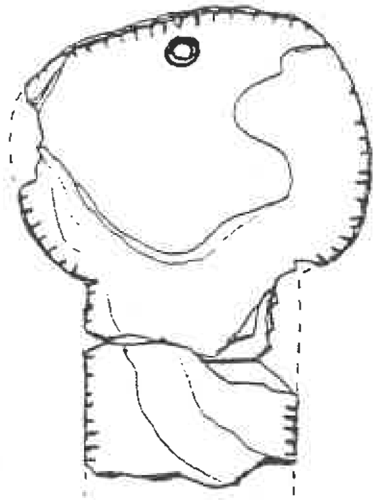


Scale 1:1

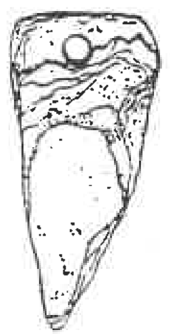
Bennyhoff Classification
(From Hylkema et al., n.d.)

Haliotis Pendants from CA-SCI-690

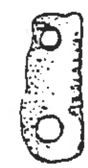
#2306
B-106



#291
EB3j



#0158
uBB8a



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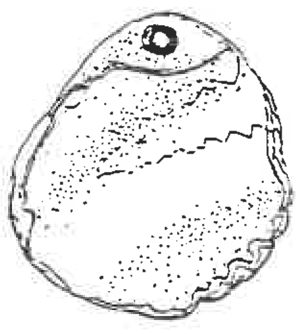
0K3j



#0316
CA5g

(From Hylkema et al., n.d.)

Bennyhoff Classification

Scale 1:1

Haliotis Pendants from CA-SCI-690

HALIOTIS PENDANTS FROM THE GUADALUPE CORRIDOR						
Pendant Type	CA-SCI-6E/447	CA-SCI-6W	CA-SCI-128	CA-SCI-300/302	CA-SCI-68	CA-SCI-137
A1c	1					
A2a	1					
AA2a		3				
AB1a		1				
AF4a		2				
AF4b		1				
AF5a		3				
AF5aIII			x			
AG1a		1				
H4			x			
K2a		5				
K3bIV					x	
N1aI			x			
N1aII						
N1aIII			12			
Q1aII					x	
Q2aIII					x	
Q25a					x	
Z2aI						
Z2aII			x			
Z2aIII			x			
Z2bI						
Z2bII			x			
Z2bIII			x			
Z3bI			x			
Others		2	77	17		1
TOTAL:	2	18	96	69	15	1

Pendants CA-SCI-690	
Type*	Amount
uBA3j	5
rBA3j	2
uBB3j	4
uBG3j	2
uCA3j	18
rCA3j	3
uCA5j	0
uEB3j	2
uEG3j	1
uFA3j	1
rOB3j	1
rOJ3j	1
uPA5j	1
uSC3j	1
uW1j	1
uW3j	0
uBA3a	4
cBB1a	3
uBB3a	4
uBB8a	6
uBB106a	1
uBG3a	0
rBG3a	1
uCA3a	18
rCA3a	1
rCA[8]a	0
uFA3a	2
uFB3a	0
uG3a	3
rOA3a	3
uG3a	3
rOA3a	3
rOJBa	0
uTA5a	1
uCA3g	8
rCA3g	5
uCA5g	2
rOJ3g	1
rCA3h	1
TOTAL:	107

* Pendants found at CA-SCI-690 have been classified using the system established by Bennyhoff

x No Specific number assigned to pendant type, pendant is listed in "Others" category

PREHISTORIC SUBSISTENCE

A large portion of prehistoric life in the Santa Clara Valley involved the daily subsistence activities of collecting and preparing food; but unfortunately, discussion of the subsistence systems that operated within the Guadalupe Corridor is hampered by the differential preservation and visibility of various resources utilized by the prehistoric inhabitants. For example, animal remains preserve much more successfully and completely in the archaeological record than do plant remains. Further difficulties are created through the differences in data collection methodologies employed in the various archaeological programs carried out in the area. Some excavations, for instance, placed a great deal of emphasis on the faunal and molluscan remains, and analyze these remains with precision (SCl-300/302). Other excavations, in contrast, focus on grave lot data, and their analyses of the prehistoric subsistence activities are not as precise. Finally, one must keep in mind that the Guadalupe Corridor sites vary in their chronology, size, location, and proximity to critical resources. Therefore, evidence of seasonality and migration patterns, the relative importance of various species in the diet, and differences between the prehistoric and modern environments must also be considered in reconstructions of subsistence economies.

Despite these difficulties, subsistence practices remain a central concern of those who study prehistoric hunter/gatherer ecology; and therefore, a basic assessment of the prehistoric subsistence economies in the Guadalupe Corridor is necessary. To this end, remains of molluscan and faunal resources, and the flotation studies carried out at a few of the sites in the study area will be considered.

Reconstructions of hunter/gatherer paleoeconomy are dependent upon the characteristics of the local environment. In the study area, most of this work was done by Roop et al. (1982), before the majority of the archaeological recovery work had begun. Roop et al. divided the area into two divisions: one in the north, which was called the Guadalupe Division, and one in the south, termed the Santa Teresa Division. He defined the Guadalupe Division as ranging from Alviso to the Hillsdale Hills, whereas the Santa Teresa Division spans the area south of the Hillsdale Hills to the base of Santa Teresa Hills and beyond to the Coyote narrows (Roop et al. 1982: 5). In addition to defining these two main areas, Roop et al. made some predictions about differences in the subsistence strategies practiced by the prehistoric inhabitants of these two regions. Now that a large pool of data has been gathered from the many recovery projects in the area, it is possible to address his predictions and to evaluate the usefulness of their two Divisions.

The separation of the area into the Guadalupe and Santa Teresa Divisions was largely based on the different natural resources thought to be available in the two areas. The northern Guadalupe Division, situated fairly close to the bayshore, had more immediate access to the rich molluscan resources of that region (Roop et al. 1982: 56-58); but it would have been more difficult for the inhabitants of the Santa Teresa Division to acquire these resources. In addition, Roop et al. described basic environmental differences between the two divisions. The Guadalupe Division consisted primarily of salt marshes and grasslands with some interspersed freshwater marshes. The central feature of the Santa Teresa Division, on the other hand, was the freshwater Canoas Marsh (Roop et al. 1982, p. 5, 56, 58-62). These basic claims about the environment of the two divisions are supported by later studies in the Guadalupe Corridor (see Cartier 1990; Fong et al. 1988; Bard et al. 1986; James et al. 1988). Roop et al.'s predictions about differential resource utilization between the two subareas are discussed in detail below.

Roop et al.'s divisions do appear to distinguish real and useful environmental zones, but it is difficult to assess exactly how these ecological differences affected the prehistoric inhabitants of the area. Several factors make it impossible to forge a direct correspondence be-

tween local ecology and overall human subsistence activity. The most basic of these factors lies in the way people gather resources. Even though a group of people often relies on the most local resources for the bulk of its subsistence activities, it is extremely rare for a group to entirely restrict itself to those resources. Migration between ecological zones and trade are just two ways in which people can make use of resources from other ecological zones. In fact, the Santa Clara Valley is considered resource-rich exactly because of the many ecozones which were available to prehistoric groups of mobile or semi-sedentary hunter-gatherers (Fentress, in Cartier 1979: 58b). Additional problems result whenever a researcher draws a line on a map to distinguish two ecological zones. Ecozone borders are rarely distinct, and areas near the edge of one division may share some of the characteristics of the neighboring division. In the Guadalupe Corridor area, this "fuzzy area" factor becomes especially problematic when analyzing sites such as SCl-128 and SCl-690, both of which lie roughly near the border of Roop et al.'s Divisions.

Obviously there are many problems inherent in the division of a landscape into ecozones and the placement of human groups within those zones. Yet Roop et al.'s model is useful initially in that it produces a set of expectations concerning differential subsistence patterns which can be tested against the available data. Of course, any conclusions reached here must remain tentative on account of the fragmentary nature of the data; but nevertheless, results of these analyses may prove useful in a final evaluation of Roop et al.'s hypotheses when taken in conjunction with future studies.

Molluscan Remains

Perhaps the most visible and clear evidence that can be brought to bear on Roop et al.'s north/south divisions comes from the dietary shell data. Roop et al. predicted that the sites in the Guadalupe Division, resting closer to the bayshore, would bear evidence that their inhabitants had utilized the molluscan resources of the bay to a great extent. The occupants of the Santa Teresa Division, he reasoned, would not have been able to acquire these bayshore resources as easily, and therefore the southern sites should contain fewer bayshore molluscan remains. The shellfish remains from the sites in the two divisions, it will be shown, generally support Roop et al.'s predictions.

General Description of Major Molluscan Species
(Information taken from Morris 1966 and Desgrandchamp 1979.)

Cerithidea californica (California Horn Snail)

This small snail has a spike-like shell about 25-34 mm. long when mature. There are approximately ten rounded whorls, sculptured with vertical ribs and revolving ridges. Color varies from light tan to dark purple. This gastropod is very abundant on the surface of mudflats and thousands are exposed in the salt marsh and on mudflats during low tides. It can be found at the maximum high tide level in estuaries, sloughs, and other brackish waters. The northerly sites in the Guadalupe Corridor were rich in *Cerithidea.*

Ostrea lurida (California or Olympic Oyster)

This is a thin, flat, irregular shaped bivalve with a foliated surface. This small oyster measures 45-60 mm. in length. It is found on the surface of mudflats and gravel bars near the mouths of streams, in bays, estuaries, and quiet coastal waters. It molds itself to the surface to which it is attached. Beds of this oyster may cover several acres and are usually ex-

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